

PC MAGAZINE

Net Tools: Small-Office Networking from Cisco, D-Link, Intel, NetGear, and 3Com



■ What You
Need to Know
About SSL 3.0

◀ 26 Network
Printers Go
Head to Head



▲ First Looks:
Tiny Philips
And Toshiba
Powerhouses

▼ After Hours:
Enliven E-Mail
With Video

■ PC Tech:
The Net-Savvy
Turn to XML



WWW.PCMAG.COM

THE INDEPENDENT GUIDE TO PERSONAL COMPUTING VOL. 17 NO. 10 MAY 26, 1998

400 MHz

New Machines from

- Acer • Compaq
- Dell • Gateway 2000
- Hewlett-Packard
- Micron • NEC
- Quantex
- Sys Technology



Introducing
Microsoft Outlook 98.



Our computers give you something no other company can match. A membership in technology, instead of just a one-time purchase. Where service, technological innovation, flexible ownership, and value go hand-in-hand. What's more, this membership is backed by the resources of a nearly \$40 billion world leader. Looking for real value? Enter here.

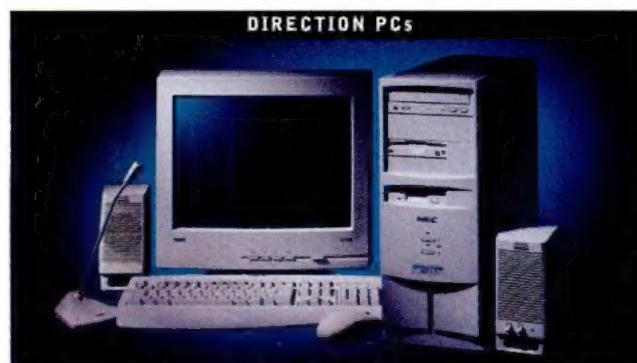


► **UltraCare™ Services,** including 30-day money back guarantees and comprehensive 24-hour, 7-day-a-week technical support by trained NEC technicians who are usually no more than 90 seconds away.

► **The UltraCare Card:** Improved software support by experts who can provide round-the-clock application and operating system solutions, quickly and effectively. Call to order.



How's this for value? Buy a computer,



"One of the best deals for neck-snapping performance. Bolt it to your desk before you boot."

Direction SPL300 - PC Computing, Mar. 1998

Looking for the latest, greatest technology? The components in our Direction PCs read like a who's who of technology — Intel, Microsoft, Iomega, 3Com, U.S. Robotics, and Diamond MultiMedia. No wonder that when it comes to performance and value, Direction consistently rakes in the awards.

NEC Direction™ Small Business

Direction SPB350

- 350MHz Pentium II processor
- ATX Minitor or Desktop Tool-Less Chassis
- 128MB SDRAM
- 512KB L2 Cache
- New 9.1GB Ultra ATA Hard Drive (7,200 rpms)
- 32X Maximum Variable-Speed CD-ROM Drive
- Number Nine Reality 334 AGP, 4MB SGRAM Graphics Card
- Altec Lansing® ACS-90 Speakers
- PCI Wavetable Audio
- NEC C900™ 19" Monitor (18" viewable, .26dp)
- Microsoft Windows 95
- Microsoft Office 97 Small Business Edition
- Microsoft IntelliMouse™, NEC Palmrest Keyboard, and Microphone
- 3-Year UltraCare Limited Warranty with 1-Year On-Site Service

Upgrades:

- Upgrade to 14GB Ultra ATA Hard Drive (7,200 rpms), add \$349
- Iomega® 100MB Internal Zip® Drive with One Cartridge, add \$99
- U.S. Robotics® x2™ 56Kbps® Modem with Data/Fax/Voice Features, add \$99

\$2599

Lease From: \$96/mo. Code #DS116

Direction 333L

- 333MHz Pentium II processor
- ATX Minitor or Desktop Tool-Less Chassis
- 64MB SDRAM
- 512KB L2 Cache
- 6.4GB Ultra ATA Hard Drive
- 32X Maximum Variable-Speed CD-ROM Drive
- Number Nine Reality 334 AGP, 4MB SGRAM Graphics Card
- Altec Lansing ACS-90 Speakers
- Integrated Yamaha Audio
- NEC C700™ 17" Monitor (16" viewable, .27dp)
- Microsoft Windows 95
- Microsoft Office 97 Small Business Edition
- Microsoft IntelliMouse, NEC Palmrest Keyboard, and Microphone
- 3-Year UltraCare Limited Warranty with 1-Year On-Site Service

Upgrades:

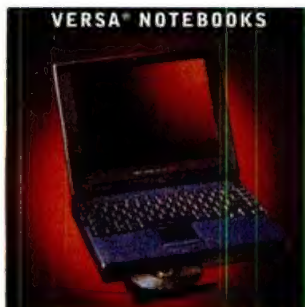
- Upgrade to 8.4GB Ultra ATA Hard Drive, add \$49
- Upgrade to NEC C900 19" Monitor (18" viewable, .26dp), add \$249
- Hewlett-Packard® LaserJet 6Lse Printer, add \$399

\$1999

Lease From: \$74/mo. Code #DS117



©1998 NEC Computer Systems Division, Packard Bell NEC, Inc. NEC, Versa, and MultiSync are registered trademarks; VersaBay, ESMPro, and Express5800 are trademarks, and UltraCare is a service mark of NEC Corporation, all used under license. Direction and MagicEye are trademarks and NEC NOW and center here are service marks of Packard Bell NEC, Inc. Leasing based on typical 36-month lease with purchase option. Other lease options may be available. Leasing arranged by third party leasing company to qualified customers. Prices do not include shipping or applicable sales tax, are valid in the U.S. only, and are subject to change without notice. Products and specifications are subject to change without notice. Microsoft, Windows, and Windows NT are registered trademarks of Microsoft Corporation. The Intel Inside logo, LANDesk, and Pentium are registered trademarks and MMX is a trademark of Intel Corporation. Hewlett-Packard is a registered trademark of Hewlett-Packard Company. All other trademarks are property of their respective owners. *Maximum download speeds are limited to 53Kbps. Actual speeds may vary. Uploads travel at speeds up to 28.8Kbps. U.S. Robotics x2 modems require x2-compatible analog phone line and x2-capable service provider. See www.usr.com/x2 for details. Integrated modems included in Versa 2700 series notebooks are designed to allow faster downloads only from K56 flex compliant digital sources. See www.lucent.com/micro/K56flex for details. 30-day money-back policy does not include return freight or original shipping/handling charges.



With its built-in 56Kbps* modem, CD-ROM, and floppy drive, a Versa 2700 notebook gives you true all-in-one convenience. It also gives you serious capabilities. Like being able to create multimedia presentations with full-motion, full-screen MPEG-1 video and 3-D stereo surround sound.

“ We like this notebook's design: With its built-in modem and CD-ROM and floppy drives, it's useful from the second it's unpacked.”

*Windows Magazine,
Feb. 1998*

Versa 2780MT

- 233MHz Pentium® processor with MMX® technology
- 12.1" SVGA Active-Matrix TFT Color Display
- 64MB EDO DRAM (128MB Maximum)
- 512KB L2 Pipeline Burst Cache
- Built-in 4.0GB Hard Drive, 20X Maximum Variable-Speed CD-ROM Drive, 1.44MB Diskette Drive, and Lithium Ion Battery
- Integrated 56Kbps* Modem
- PCI Bus Architecture with NeoMagic™ 128-Bit Graphics Accelerator
- Stereo Speakers and Subwoofer with 3-D Surround Sound and Yamaha Wavetable
- 32-Bit CardBus and Zoomed Video Support
- USB and 4Mbps Fast Infrared Ports
- Microsoft® Windows® 95, Microsoft Home Essentials® including Word 97

Upgrades:

- Upgrade to 128MB RAM, add \$499
- PowerXtender™ Airplane and Auto Adapter, add \$89
- 2nd Lithium Ion Battery, add \$199
- VersaPro™ Ballistic Nylon Carrying Case, add \$89

\$2899

Lease From: \$107/mo. Code #V2713

Versa 2780MT

- 233MHz Pentium processor with MMX technology
- 12.1" SVGA Active-Matrix TFT Color Display
- 32MB EDO DRAM (128MB Maximum)
- 512KB L2 Pipeline Burst Cache
- Built-in 2.1GB Hard Drive, 20X Maximum Variable-Speed CD-ROM Drive, 1.44MB Diskette Drive, and Lithium Ion Battery
- Integrated 56Kbps* Modem
- PCI Bus Architecture with NeoMagic™ 128-Bit Graphics Accelerator
- Stereo Speakers and Subwoofer with 3-D Surround Sound and Yamaha Wavetable
- 32-Bit CardBus and Zoomed Video Support
- USB and 4Mbps Fast Infrared Ports
- Microsoft Windows 95, Microsoft Home Essentials including Word 97

Upgrades:

- Upgrade to 64MB RAM, add \$249
- PortBar™ 2700, add \$159
- NEC Xircom® 10/100 CardBus Network Card, add \$159
- VersaNote™ Ballistic Nylon Compact Carrying Case, add \$59

\$2499

Lease From: \$92/mo. Code #V2711

get a computer company, free.

Series Desktops

Direction 266L

- 266MHz Pentium II processor
- ATX Minitor or Desktop
- Tool-Less Chassis
- 32MB SDRAM
- 512KB L2 Cache
- 4.3GB Ultra ATA Hard Drive
- 32X Maximum Variable-Speed CD-ROM Drive
- Number Nine Reality 334 AGP, 4MB SGRAM Graphics Card
- Altec Lansing ACS-90 Speakers
- Integrated Yamaha Audio
- NEC C700 17" Monitor (16" viewable, .27dp)
- Microsoft Windows 95
- Microsoft Office 97 Small Business Edition
- Microsoft IntelliMouse, NEC Palmrest Keyboard, and Microphone
- 3-Year UltraCare Limited Warranty with 1-Year On-Site Service

Upgrades:

- Upgrade to 64MB SDRAM, add \$79
- Iomega 100MB Internal Zip Drive with One Cartridge, add \$99
- 3Com® 3C905 Fast Etherlink™ XL 10/100 PCI Network Card, add \$79

\$1599

Lease From: \$59/mo. Code #D5118

Direction SPB400

- 400MHz Pentium II processor
- ATX Minitor or Desktop
- Tool-Less Chassis
- 64MB SDRAM
- 512KB L2 Cache
- 4.3GB Ultra ATA Hard Drive
- 32X Maximum Variable-Speed CD-ROM Drive
- Diamond Viper® AGP, 4MB SGRAM Graphics Card
- Altec Lansing ACS-90 Speakers
- PCI Wavetable Audio
- U.S. Robotics x2 56Kbps* Winmodem™
- NEC C700 17" Monitor (16" viewable, .27dp)
- Microsoft Windows 95
- Microsoft Home Essentials 98
- Microsoft IntelliMouse, NEC Palmrest Keyboard, and Microphone
- 3-Year UltraCare Limited Warranty with 1-Year On-Site Service

Upgrades:

- Upgrade to NEC C900 19" Monitor (18" viewable, .26dp), add \$249
- DVD-ROM Drive with Decoder Card, add \$279
- Diamond Monster 3D II 12MB Graphics Accelerator Card with 3Dfx® Voodoo™ Technology, add \$249

\$2299

Lease From: \$91/mo. Code #D5112

Direction 333L

- 333MHz Pentium II processor
- ATX Minitor or Desktop
- Tool-Less Chassis
- 32MB SDRAM
- 512KB L2 Cache
- 4.3GB Ultra ATA Hard Drive
- 32X Maximum Variable-Speed CD-ROM Drive
- Diamond Viper AGP, 4MB SGRAM Graphics Card
- Altec Lansing ACS-90 Speakers
- Integrated Yamaha Audio
- U.S. Robotics x2 56Kbps* Winmodem
- NEC C700 17" Monitor (16" viewable, .27dp)
- Microsoft Windows 95
- Microsoft Home Essentials 98
- Microsoft IntelliMouse, NEC Palmrest Keyboard, and Microphone
- 3-Year UltraCare Limited Warranty with 1-Year On-Site Service

Upgrades:

- Upgrade to 64MB SDRAM, add \$79
- Upgrade to 6.4GB Ultra ATA Hard Drive, add \$89
- Iomega 100MB Internal Zip Drive with One Cartridge, add \$99

\$1899

Lease From: \$75/mo. Code #D5114

Direction 266L

- 266MHz Pentium II processor
- ATX Minitor or Desktop
- Tool-Less Chassis
- 32MB SDRAM
- 512KB L2 Cache
- 4.3GB Ultra ATA Hard Drive
- 32X Maximum Variable-Speed CD-ROM Drive
- Diamond Viper AGP, 4MB SGRAM Graphics Card
- Altec Lansing ACS-90 Speakers
- Integrated Yamaha Audio
- U.S. Robotics x2 56Kbps* Winmodem
- NEC C550™ 15" Monitor (14" viewable, .27dp)
- Microsoft Windows 95
- Microsoft Home Essentials 98
- Microsoft IntelliMouse, NEC Palmrest Keyboard, and Microphone
- 3-Year UltraCare Limited Warranty with 1-Year On-Site Service

Upgrades:

- Upgrade to NEC C700 17" Monitor (16" viewable, .27dp), add \$199
- Upgrade to 64MB SDRAM, add \$79
- Hewlett-Packard DeskJet 694C Printer, add \$239

\$1499

Lease From: \$59/mo. Code #D5115

Call now to order your customized PC.

1-888-863-2669

www.necnow.com

Mon-Fri 8am-8pm EST

Dept. No. PC782A

<enter here>™

NEC

The Fifth Age of Computing



When people talk about technology and where it's headed, we look at the world through the prism of where technology has been. Too often the debates on computing in the future are framed around the computing architecture of the past. In the beginning, computers were all very centralized. The first computers were used

by governments, often in areas such as code breaking. Later, large companies purchased mainframe computers run by experts. In the Mainframe era, centralized computing wasn't even questioned.

The Minicomputer era changed that by making computers available to more organizations. Much of computing remained centralized as time-sharing systems became popular, but more and more we saw machines dedicated to specific tasks, largely in technical fields.

That led to the third era, Personal Computers. Power went to individuals with computers at home or the office. In many cases, someone brought a PC into work or bought it through a purchasing department without IT department knowledge. At first, individuals were responsible for their own PCs. Soon, word processing, spreadsheet, and small database applications became crucial parts of organizations. Then IS began to take over purchasing and making sure all the devices worked together.

This spawned the era of Client/Server Computing, with its emphasis on mission-critical applications that were often managed on the server and on intelligent clients entering and retrieving data and running office-productivity applications. Today, this defines the heart of enterprise computing.

Much of the argument about centralized versus decentralized computers is based on this current view. So are most of the questions about network computers. The argument: When you lower the cost of running the client, you can lower the cost of computing, even if that means higher server costs. What the argument misses is that we are making the transition into a new era of computing.

The signs of this new era are everywhere. The In-

ternet started as a method for the government and universities to communicate; now it is a new medium for consumers and a platform for business applications. Where PC once defined one machine, it now means all sorts of market segments, from hand-held devices to servers. Microprocessors have made their way into personal things, such as digital assistants and phones.

The combination of the Internet and new devices signals the shift into the era of Ubiquitous Computing, which I'll call the Fifth Age of Computing. That does not mean that PCs or client/server applications will disappear; neither did mainframes or minicomputers. Like all the shifts beforehand, the shift to this era will be gradual and will encompass the legacy of generations that have gone before.

In this new era, we'll each use all sorts of devices. Each device will have more computing power than the PCs of the 1980s or the mainframes of the 1960s and 1970s. With all these devices, the whole concept of centralized control will be alien. The devices will have to work independently, but they will also have to be able to communicate with one another.

Still, this doesn't mean the end of big computers or big databases. In fact, more crucial information than ever will be stored in large databases managed by IT departments. As a result, more communications and commerce will take place.

To make all this happen, we'll need more kinds of machines—not one computing platform but many. We'll need proprietary platforms optimized for different kinds of devices but also a common set of standards to make certain the devices can work together. In other words, the key issue is not independence but interdependence. Not command and control but communication and cooperation. Not either centralized or decentralized computing but both at the same time.

A stylized, handwritten signature of Michael J. Miller in black ink.

MICHAEL J. MILLER

THE SURGEON GENERAL HAS WARNED THAT SEVERAL THINGS CAN STUNT YOUR GROWTH.

PC servers* appear to be perfectly harmless. But if you tie them to the growth of your company, you may

find yourself with little room to breathe. Especially when you're looking for more transaction throughput,

better Web performance, and a scalable home for your key business applications.

The Sun™ Enterprise 450 Workgroup Server, starting below \$15,000, delivers

print and file services for your workstations, thin clients and PCs. What's more,

true enterprise-class solutions from Lotus® and Oracle® will run like they're tuned for Sun—because they

are. And since the Sun Enterprise 450 is part of a family that scales up to 64 processors, you'll never

have to sacrifice business-critical scalability. Plus, Sun supports the Enterprise 450 with worldwide

customer service. So call 800-SUN-FIND today for a Sun representative or reseller near you. Or visit

us at www.sun.com/wgs/pmg. Before you get hooked on the wrong thing. THE NETWORK IS THE COMPUTER.™



ANY DAY NOW, HE'LL INCLUDE PC SERVERS.

*PC servers refers to servers running Microsoft® Windows® NT®. ©1998 Sun Microsystems, Inc. All rights reserved. Sun, Sun Microsystems, the Sun Logo and The Network Is The Computer are trademarks or registered trademarks of Sun Microsystems, Inc. in the United States and other countries. Other trademarks are the property of their respective owners.

Choose 023 at www.pcmag.com/infolink

UP FRONT

From the Editor-in-Chief	4
Pipeline	9
Letters	21
Trends	28
▶ Sun's Java springs eternal	
▶ Web phones untangled	
▶ Inside PC Labs	
▶ What's XML?	
PCs	35
▶ 350- and 400-MHz Pentium II PCs	
Software	36
▶ Web design tools	
▶ Flash 3	
Peripherals	38
▶ Digital cameras	
Internet	39
▶ Web authoring tools	
▶ Internet streaming audio	
Networking	42
▶ Online backup	
First Looks	45
▶ Create your own music CDs	
▶ Tiny powerhouses from Philips and Toshiba	



▶ Macromedia's FreeHand 8	
▶ Xybernaut 133P	
Second Looks	79
▶ Corel WordPerfect Suite 8	
▶ Speech recognition fixes	

COLUMNISTS

JAKE KIRCHNER	30
BILL MACHRONE	85
JOHN C. DVORAK	87
INSIDE TRACK	89
JIM SEYMOUR	93
BILL HOWARD	97

COVER STORY

400MHz Pentium II PCs



BY MICHAEL SLATER

Systems keep getting faster and faster, but they're also more and more affordable. We review the first PCs built on Intel's new BX chip set, which features a 400-MHz CPU and a 100-MHz system bus. These speedy systems come loaded with huge hard disks, 64MB of RAM with room for lots more, and 56K modems. A few have DVD drives and large monitors. Make one of these high-end boxes yours for around \$3,000100

Acer America Corp.	108
Compaq Computer Corp.	116
Dell Computer Corp.	116
Gateway 2000 Inc.	125
Hewlett-Packard Co.	125
Micron Electronics Inc.	128
NEC Computer Systems Division	128
Quantex Microsystems Inc.	130
Sys Technology Inc.	130

Editors' Choice	103
Evolution of a Processor Platform	103
Price/Performance Index	104
CPU Comparison	106
Vendor Service and Reliability	108
Performance Tests	120
Summary of Features	124

HARDWARE

Network Printers



BY JAMES KARNEY AND M. DAVID STONE
Shopping for a new office printer? We rounded up all the latest monochrome and color network lasers printers to help you find the best fit. Don't miss our color output samples. Or maybe you're thinking of a convergence product? We also review a couple of devices that combine printing with digital-copier functions.....132

Editors' Choice.....	134	Xerox Document Centre 230LP.....	154
Printers in the Scheme of Things.....	134	Xerox DocuPrint N24, N32.....	158
Copier Companies Fight Back.....	138	Performance Tests.....	140
Monochrome Network Laser Printers:		Summary of Features.....	156
Apple LaserWriter 8500.....	139	Color Network Laser Printers:	
HP LaserJet 4000TN, 5000GN.....	139	Brother HL-2400CN.....	160
IBM InfoPrint 20.....	146	HP Color LaserJet 5M.....	160
Lexmark Optra S1255n, S1625n, S1855n, S2455n.....	148	Lexmark Optra SC1275n.....	162
Minolta PageWorks 12, PageWorks 20.....	150	Panasonic KX-P8410, KX-PS8000.....	168
NEC SuperScript 1260.....	152	QMS magicolor 2 CX, magicolor 2 EX.....	168
Okidata OkiPage 200Xn.....	152	Tektronix Phaser 360, 560.....	171
QMS 2060 EX, 2425 Turbo EX.....	154	Color Output.....	162
		Performance Tests.....	164
		Summary of Features.....	170

NETWORKING

Personal ISDN Routers

BY LES FREED
Here's a neat kind of product just when you need it. These kinder, gentler ISDN routers help you make the most of your ISDN investment. Just connect your PCs with a simple network and attach one of these well-priced boxes, then share the ISDN line. Most come with software wizards that walk you through configuration.....173



ACC Congo Personal Router.....	176	How DHCP and NAT Let You Share a Single ISDN Connection.....	174
Arescom Apex 1100-3.....	180	Suitability to Task.....	174
Ascend Pipeline 75.....	184	Editors' Choice.....	175
Bay Networks Nautica 200.....	188	Thumbs Up/Thumbs Down.....	176
Cisco 766.....	192	Getting Set Up with ISDN.....	178
Ramp Networks WebRamp.....	192	ISDN Sharing, Cheap.....	180
Entré.....	192	ISDN Sharing, Software-Style.....	184
Shiva AccessPort 2.0.....	197	Performance Tests.....	186
3Com OfficeConnect ISDN LAN Modem.....	199	Alternative Technologies for Fast Connections.....	188
ZyXEL Prestige 100, Prestige 128.....	199	Summary of Features.....	196

Get more online at www.pcmag.com.

Cover Story Exclusive:

How Fast is Fast?

What's the benefit of 400 MHz? See our online test results for insights.

Plus:
► Michael J. Miller answers your questions every Tuesday. Be sure to write in with your queries.



Visit the Virtual Labs:

Test It Yourself

Try out new products live online. Available now: Web discussion software.

Plus:
► Second Looks! Sound off on new products.



Multimedia Extra: CD plus Web Site

Guided Tours!

Multimedia reviews of
► Hot new PCs
► Top hardware accessories
► Top 100 Web sites



Plus: Back-issue database

Visit Extra at www.pcmagextra.com. To order, call 800-335-1195 in the U.S.

Download this issue's free utility at www.pcmag.com/download.

Net Tools

Small-Office Networking.....201
Is one-stop shopping the best way to create your small-office LAN?



From the Bench.....217

- Shomiti Explorer 1.3 and Surveyor 2.3
- WebChallenger
- Network Appliance NetCache C630

Internet Tools.....221

Look under SSL's hood and see how the protocol works.

PC TECH

The Net-Savvy Turn to XML.....229

Internet Tech.....239

IMAP makes e-mail more accessible and private.

Utilities.....261

Free utility: Find the font you want with FontViewer.

PC SOLUTIONS

User-to-User.....269

Ask Our Advisors.....314

AFTER HOURS

Enliven E-Mail With Video.....319

Easy-to-use products that give e-mail a personal touch.

Also in This Issue

PC Magazine Marketplace.....	293
BusinessCard.....	316
Editorial Product Index.....	328
Advertisers' Index: Companies.....	329
Advertisers' Index: Products.....	330
Coming Up.....	332
Abort, Retry, Fail?.....	334

Going Up?

Get off at the top with

ATI's award winning All-in-Wonder Pro.



Just install one board – the ATI ALL-IN-WONDER PRO and take your PC to new multimedia heights. ALL-IN-WONDER PRO – the newest and fastest member of the All-in-Wonder family.

With the TV Tuner's new instant replay feature you can take control of your TV viewing so you won't miss out on any action. Monitor your favourite channel in the background while using other applications. Display games and presentations out to a big screen TV. Accelerate 3D graphics to make your computer games explode and your design projects sizzle. Capture video from your TV, VCR, or camcorder and display high quality video, including MPEG, at full screen or in a window.

If you've wanted to upgrade your PC but didn't know which way to go – buy ATI's ALL-IN-WONDER PRO and get all of these upgrades for one price in one card.

To feel the thrill of the ALL-IN-WONDER PRO experience check out our website for a really cool demo of these incredible features – at www.atitech.com/pcmag. Get ATI ALL-IN-WONDER PRO and get off at the top!



© Copyright 1997, ATI Technologies Inc., ATI, 3D RAGE PRO and ALL-IN-WONDER are trademarks and/or registered trademarks of ATI Technologies Inc. All other company and/or product names are trademarks and/or registered trademarks of their respective manufacturers. Products may not be exactly as shown. *ESP ALL-IN-WONDER 4MB



Now You See It.™
www.atitech.com/pcmag



Choose 101 at www.BEM08-68M/00010K

Pipeline

In Defense of Push

Push technology—the delivery of broadcastlike information to desktops—has lost its buzzword status, strangled primarily by bandwidth limitations. In the past year, several large companies have banned the pioneering push application PointCast, because of excessive hogging of network resources.

Push hasn't died as a concept,

specific industries, such as software distribution. "Software providers need to move toward a subscription-based services model, where applications and upgrades can be delivered from remote locations and managed remotely," she says.

Upgrades and maintenance of an application would fall to the software provider, not to the



however. According to two of the most vocal proponents of push, PointCast CEO David Dorman and Marimba CEO Kim Polese, it still has potential. In Dorman's view, corporate extranets (which link businesses over the Web) and electronic commerce of all kinds will rescue push from irrelevance. Market research firm Yankee Group foresees \$19 billion a year in Internet-based e-commerce revenues by the turn of the century.

Marimba's Polese sees bright horizons for push technology in

corporation's IT department. Polese says this model would limit corporate expenses and decrease software companies' spending on distribution and support.

Signs that Polese's idea is coming to fruition already exist. US West recently joined forces with several software providers, including Microsoft and Oracle, to lease and sell applications to businesses. Polese says that this trend will extend to many telephone companies and Internet service providers, which will remotely deliver, install, and upgrade applications.

Lexis-Nexis Killer?

Northern Light (www.northernlight.com)—the high-end Internet search engine that lets you search thousands of specialized journals and other non-Internet-based information sources, for a fee—is now offering enterprise/corporate accounts for a surprisingly low minimum usage fee of \$40 per month.

Why? Northern Light is making the point that it can do what traditional research services like Lexis-Nexis do, at about one-third the cost. With no charge for querying, with average document-retrieval fees from \$1 to \$4, and with a no-questions-asked refund policy if you don't like a document you buy, Northern Light is poised to shake up the economics of the information-retrieval market.

Pick a Browser, Any Browser

59%

of respondents in a recent PC Magazine Online poll told us they used a Netscape Web browser (Version 3.x or 4.x). Another 40 percent told us they used Microsoft Internet Explorer (Version 3.x or 4.x). That left us to wonder what the other 1 percent of the respondents were using to get on the Web.

Pizza in Palo Alto

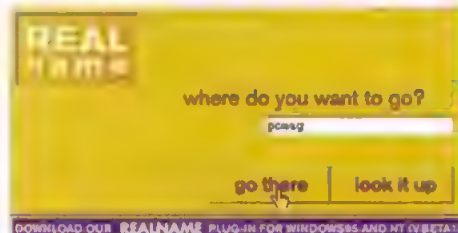
The race to find a winning way to get beyond the problem of cumbersome URLs continues. The latest innovation is Real Name System, from Centraal Corp. (www.centraal.com), a complex XML-based registra-

tion scheme that lets a Web page designer attach simple words to individual pages to help surfers find them. For an annual fee of \$40, Volvo, for instance, could attach

the word *Volvo* to a page like www.volvocars-usa.com/home.html, so that you'd simply have to type *Volvo* to get to that page. A pizza parlor in Palo Alto could register *pizza in Palo Alto*.

Rather than requiring you to download software or go to a specific site to use such words, Centraal is hooking up with Internet directories, search engines, and the like. Some time soon, you may arrive at a directory and be able to search for everything relating to

Volvos (as you can now) or go straight to the Volvo page. As part of the business model, an Internet directory will get a small payment whenever someone uses a "Go" word from its site.



DOWNLOAD OUR REALNAME PLUGIN FOR WINDOWS AND NT (VBETAIN)

tion scheme that lets a Web page designer attach simple words to individual pages to help surfers find them.

For an annual fee of \$40, Volvo, for instance, could attach

www.pcmag.com

Benchmark Tests: The Fastest PCs

This issue's cover story on fast PCs continues online, with downloadable versions of our tests and feature summaries.

Second Looks Arrives Online

You've used the products; now tell us what you really think. Don't be shy.

PC Tech's Top 10 Downloads

We keep a tally of our popular utilities. Download the free utilities everyone's talking about.

First Looks, Fresh Every Day

First Looks Online reviews products as soon as they ship. Be the first to find out our verdict.

Take Our Instant Poll

We have some questions for you. Stop by every week for our quick poll, and get instant feedback on whether you hold the majority opinion.

Pipeline

Swish!

College basketball's best players monopolized television screens everywhere during the NCAA tournament in March. But this year, Web sound bites, video, digital photography, and live statistics both challenged and complemented the televised onslaught.

Several sites—including CBS SportsLine (www.cbs.sportsline.com), ESPN SportsZone (<http://ESPN.SportsZone.com>), and Total Sports (www.totalsports.com)—catered to the growing contingent of cyber-hoops fans. The implications for coverage of all sports are broad. You could chat with Georgetown coach John Thompson and fans, enjoy live audio and video broadcasts, plot the live tournament bracket as it changed, watch regional games not televised in your area, and pore over statistical minutiae.

Web coverage extends to contests beyond basketball games. In March, CBS broadcast a professional skating tournament that viewers judged live on the Web. And as the baseball season gets underway, several stadiums are experimenting with seats with screens that let fans call up stats and other information.

A year ago, chess fans marveled at the move-by-move Webcasts of Garry Kasparov's losing bid to beat IBM's chess computer, Deep Blue. Millions viewed not only chessboards displaying the moves live but also chats and move analyses by chess masters.

How long will it be before digital photographs and video chronicle the exploits of chess players? In fact, at the Internet Chess Club's site (www.chessclub.com), you can now watch the world's top-level chess games played live on graphical boards and chat with other enthusiasts.



Resolution Revolution

Though it consists of nothing more than a horizontal and vertical matrix of colored pixels, the bitmapped picture captures the world's beauty and complexity. But high-resolution bitmaps also eat up storage space, slow down networks, and require wide-bandwidth connections to service bureaus. To complicate matters, designers and publishers must often scan pictures several times to accommodate the differing resolution requirements of high-quality printouts, multimedia presentations, and Web transmissions.

Iterated Systems, an Atlanta-based company, hopes to eliminate these problems with STiNG, a new still-image for-



mat that combines fractal encoding with wavelet and JPEG compression. It lets graphic artists generate a single file that can be rendered at a number of resolutions and delivered across various bandwidths.

Iterated Systems plans to license STiNG to hardware and software developers. Altamira Group has announced that its Adobe Photoshop plug-in Genuine Fractals Pro will use the format. A Windows version is scheduled to ship in the third quarter of this year.

THIS ISSUE'S CONTRIBUTORS: Angela Hickman, Carol Levin, Sebastian Rupley, Luisa Simone, and Don Willmott.

Click Here! Win Big!

What's a minute of your time worth? A Rachmaninoff CD? A best-selling book? How about an all-expense-paid trip to Hong Kong?

Web site developers increasingly are using such freebies and other incentives to entice you to take a few minutes to register at their sites. The approach helps them find out who's visiting—

women over 30 with two or more kids, for example—



not just how many people are clicking through their sites.

Microsoft's travel site, Expedia (www.expedia.com), has offered round-trip airfare for two to Seattle, Washington, and to the San Juan Islands. Until recently, Salon (www.salon.com) was promoting a contest in which a lucky Salon newsletter subscriber could win a trip to Hong Kong. And during ski season, Digital's virtual recruiting center (www1.digital.com/careers) was offering recent college grads the chance to win a weekend ski package.

Top-Selling Retail Notebooks

IBM ThinkPad 760XL M166

IBM ThinkPad 380ED M166

Toshiba Tecra 520CDT M166

IBM ThinkPad 380D M150

IBM ThinkPad 760XD M166

NEC Versa 6230 M233

IBM ThinkPad 765D M166

Toshiba Portégé 660CDT

Compaq Armada 7730MT M166

Toshiba Satellite Pro 440CDT

Source: Computer Intelligence InfoBeds, Data for January.

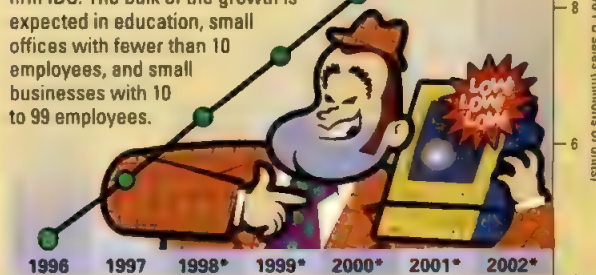
Virtual Video Shelves

So that video you want is always rented out? If Microsoft gets its way, a clerk at the store might do an online search of a store across town to look for copies. Microsoft's ActiveStore—software that's based on BackOffice and is now in prerelease—has attracted over 500 retail chains.

The goal, says Microsoft executive vice president Steve Ballmer, is "standard interfaces between retail applications." The next step may be to let you check the Web for that video title.

Used PCs Get Respect

Over the next several years, used PCs will be more richly configured than ever before and will meet user demands for a longer period of time, according to research firm IDC. The bulk of the growth is expected in education, small offices with fewer than 10 employees, and small businesses with 10 to 99 employees.



Source: International Data Corp

* Projected

Cisco is making

billions running its business

on Oracle Financial and

Manufacturing Applications.

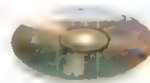
So, what are you

running on these days?



©1998 Oracle Corporation. All rights reserved. Oracle and Enabling the Information Age are registered trademarks of Oracle Corporation.
All other company and product names are trademarks of their respective owners.

Cisco Systems is a global, networked business. As the worldwide leader in networking for the Internet, Cisco has rocketed to multi-billion dollar size in just a few years. How does a fast-growing company effectively manage its business? With Oracle Financial and Manufacturing Applications. Cisco runs its worldwide business operations on Oracle Financial, Manufacturing and Order-Entry Applications. What's more, all Cisco operations are managed off of Oracle databases. Even customers and business partners gain direct access to Oracle databases to improve business efficiency. Oracle Applications have helped Cisco cut costs, increase sales and add accuracy, speed and flexibility to its business operations. Running its business on Oracle, Cisco has become the most highly networked business in the world. Give your business what it needs to run more competitively. Call 1-800-633-1062, ext. 13560, for a free CD and learn how other companies move ahead with Oracle Applications, or visit www.oracle.com/info/4



ORACLE®
Enabling the Information Age®

AT 360 DPI
YOU SEE THE
DUCK.

AT 720 DPI
YOU SEE THE
FEATHERS



YOU'VE GOT TO SEE IT IN

EPSON

COLOR.

AT 1440 DPI
YOU SEE THE
DECOY.

This decoy could fool a real duck. It may even have fooled you. But it didn't fool our printer. See the brush strokes on the chest? The way the water drop beads on the neck? The amazing EPSON Stylus® Color printers picked up every telling detail. Because they're designed with our exclusive PerfectPicture™ Imaging System. 1440 x 720 dpi for incredible detail. Micro Piezo™ Technology for a clean, consistent dot. And Photo Quality color with laser-sharp black text—for print quality that's already won 62 major awards, including PC Magazine's Editor's Choice. You'll get overall print speeds faster than the leading competitor's. PC/Mac compatibility. Plus a two-year warranty. For more information, call 1-800-GO-EPSON (ask for Operator 3064) or visit us at www.epson.com. Just tell them a little bird told you.

**PRESENTING THE WORLD'S FIRST 1440 DPI
COLOR INK JET PRINTERS.**



EPSON Stylus® Color 800. The best printer for business.

EPSON Stylus® Color 600. The best printer for small offices.

Choose 004 at www.pcmag.com/infolink

DO you wanna take IT ONLINE?

Opinions

@
w
w
w
.
p
c
m
a
g
.
c
o
m



ZIFF DAVIS
SOFTWARE



EDITOR-IN-CHIEF Michael J. Miller

EDITOR Jake Kirchner

SENIOR EXECUTIVE EDITOR Bill Howard

EXECUTIVE EDITORS Leon Erlanger, Peter McKie, Gail Shaffer, Don Willmott

DIRECTOR, PC LABS Steve Buehler

ART DIRECTOR Laura Baer

SENIOR NETWORKING EDITOR Frank J. Derfler, Jr.

SENIOR ONLINE EDITOR John Clyman SENIOR EDITORS Carol Venezia (First Looks), Sebastian Rupley (West Coast)

MANAGING EDITOR Paul B. Ross

RESEARCH EDITOR Jim Bartimo

SENIOR ASSOCIATE EDITORS Jamie M. Bsaies (Hardware), Carol Levin (Trends), Sharon Terdeman (Technical Columns) ASSOCIATE EDITORS Toni F. Kistner and Sarah L. Roberts (Networking and Communications), David Lidsky (Internet), John Morris (Software), Tom Ponzo (First Looks Online), Jennifer Triverio (After Hours), Anush Yeghazarian (PCs) ASSISTANT MANAGING EDITOR Kim Schueler PRODUCTION EDITOR Monica Sirignano COPY CHIEF Glen Boisseau BECKER STAFF EDITORS Mary E. Behr, Doug Beizer, Robert Daly, Matthew Graven, Nancy E. Hirsch, Josh Levy, Elyn J. McCasland, Michael W. Muchmore, Melissa J. Perenson, Michael N. Ruscignuolo SENIOR WRITERS Robert S. Anthony, Cade Metz STAFF WRITER Angela Hickman SENIOR COPY EDITORS Jennifer Golub, Joseph N. Levine COPY EDITORS Paul Dwyer, Michael Feist, Bill Kravitz, Barbara McGeoch, Ann Ovodow ASSISTANT COPY EDITOR Carol Mangis PRODUCTION MANAGER Patricia Perkowski SENIOR LAYOUT EDITOR Lillian Gaffney LAYOUT EDITOR Michel Dluginski PRODUCTION SYSTEM SUPPORT ANALYST Nancy Goodman-Slayback LIBRARIAN Nancy Sirapyan LIBRARY ASSISTANT Dolores Williams EDITORIAL RESEARCHERS Adam Asch, Roderick A. Beltran, Gary Berlina, Emily Cohen, Stephanie Lindenbaum, Sharon Nash, Angela Tuka EDITORIAL ASSISTANT Brett Krasnova SYSTEM SUPPORT MANAGER Craig Ellison NETWORK SUPPORT ANALYST Melvin Acevedo COMMUNICATIONS MANAGER Patricia Reger ASSISTANT TO THE EDITOR-IN-CHIEF Christine Curti ASSISTANT TO THE EDITOR Rita Arahamian ASSISTANT TO THE EXECUTIVE EDITORS Christine M. Evelyn ADMINISTRATIVE ASSISTANT Christine Okang SYSOP, PC MAGNET Ken Hipple

CONTRIBUTING TECHNICAL EDITOR Neil J. Rubenking CONTRIBUTING EDITORS Bill Machrone (Vice President, Technology), Greg Alwang, Douglas Boling, Padraic Boyle, Bruce Brown, Brian Butler, Sheryl Canter, John C. Dvork, Les Freed, Daniel Grotta, Sally Wiener Grotta, Michael J. Mefford, Edward Mendelson, Jan Ozer, Charles Petzold, Stephen W. Plain, Tony Pompili, Alfred Poor, Jeff Prossie, John R. Quain, Sel Ricciardi, Steve Rigney, Winn L. Rosch, Joe Salemi, Jim Seymour, Barry Simon, Luisa Simone, Craig Stinson, M. David Stone

SENIOR ASSOCIATE ART DIRECTOR Richard Demler ASSOCIATE ART DIRECTORS Lisa Kocaurek, Dean Markadakis, Michael Scowden ASSISTANT ART DIRECTOR Lora Morgenstern GRAPHICS DIRECTOR David Foster GRAPHIC ARTIST Mark Tyner ART PRODUCTION MANAGER Talar Min CONTRIBUTING PHOTOGRAPHER Thom O'Connor ASSISTANT TO THE ART DIRECTOR Frieda T. Smallwood

TECHNICAL DIRECTORS Ben Z. Gottesman (Software), Nick Stam (Hardware), Jeffrey G. Witt (Networking and Communications) DIRECTOR, OPERATIONS John R. Delaney SENIOR PROJECT LEADERS Kristina DeNike (Networking and Communications), Richard Fisco (PCs), Jay Munro (Internet, PC Tech) PROJECT LEADERS Laura Cox (First Looks), Diane Jecker (Software), S. Jae Yang (Hardware), Kevin Young (Net Tools) PROGRAMMERS Richard V. Dragan, Win Swarr PRODUCT TESTING MANAGER Charles Rodriguez TECHNICAL ANALYSTS Oliver Kaven, Melanio Lopez, Jacqueline Paredes, Ryan Snedegar, Mark Valentine, Martin Wong SUPPORT TECHNICIANS David Carola, William Pagan, Miriam Sampson, Sunita Sawh, Brad Walden INVENTORY CONTROL MANAGER Tom Kennedy INVENTORY CONTROL COORDINATORS Richard P. Bifone, Rob Graydon, Bryan Hughes ADMINISTRATIVE ASSISTANTS Leslie Sorich, Courtney L. Trabon

PC MAGAZINE ONLINE

TECHNICAL DIRECTOR Larry Seltzer (Virtual Labs) ART DIRECTOR Albert Larew MANAGING EDITOR Tin Albano SENIOR EDITOR Heather Crombie SENIOR PROGRAMMER William Ulrich SENIOR TECHNICAL EDITOR Thomas W. Giebel TECHNICAL EDITOR Webster T. Mudge DESIGNER Marcie Gandell STAFF EDITORS Jennifer L. Anderson, Troy Dreier, Richard Egan PRODUCTION EDITOR Matthew Slaybaugh

PUBLISHING DIRECTOR Nancy Newman

PUBLISHER Peter Longo

NATIONAL SALES DIRECTOR Vickie Pinsky GROUP BUSINESS DIRECTOR Bret Violette ASSOCIATE BUSINESS MANAGER Christine Holsten ASSOCIATE MARKETING DIRECTOR John Wisdom RESEARCH DIRECTOR Gordon Plutsky EVENTS MANAGER Dawn Gudelis

SENIOR ADVERTISING PRODUCTION MANAGER Susan Conrad ADVERTISING PRODUCTION MANAGER Ivis Fundichely ADVERTISING PRODUCTION COORDINATORS Nicole A. Folkes, Simone Oliver-Weekes EDITORIAL PRODUCTION MANAGER Pamela J. Berkowitz COORDINATOR, EDITORIAL PRODUCTION Louise Laberge

ADVERTISING OFFICE: One Park Ave., New York, NY 10016-5802; 800 33 MAG AD, 212-503-5100

THE INDEPENDENT GUIDE

PC Magazine is the Independent Guide to Personal Computing. Our mission is to test and review products and report fairly and objectively on the results. Our editors do not invest in firms whose products we review, nor do we accept travel tickets or other gifts of value from such firms. Except where noted, PC Magazine reviews are of currently available products. We review products without regard to advertising or business relationships with any vendor. Softbank, the corporate parent of Ziff-Davis Inc., has made a number of strategic investments in high-technology companies. A list of those companies is available online at www.pcmag.com/faq, and we will alert our readers to such investments whenever pertinent.

HOW TO CONTACT THE EDITORS

We welcome comments from readers. Send them to Internet address pcmag@zd.com or to PC Magazine, One Park Ave., New York, NY 10016-5802. Please include a daytime telephone number. PC Magazine's general number is 212-503-5255. The West Coast Operations number is 650-513-8000. We cannot look up stories from past issues, recommend products, or diagnose problems with your PC by phone. For an index of past issues and a list of upcoming stories, browse www.pcmag.com.

If you are dissatisfied with a product advertised in PC Magazine and cannot resolve the problem with the vendor, write (do not call) Ellen Askin, Advertising Department, at the above address. Please include copies of your correspondence with the vendor.

SUBSCRIPTION SERVICES

Internet: <http://subscribe.pcmag.com/service>. Telephone: 303-665-8930, U.S. only; 303-604-7445 elsewhere. Mail: PC Magazine, P.O. Box 54093, Boulder, CO 80322-4093.

Subscription rates. The one-year rate (22 issues) is \$49.97 in the U.S., \$85.97 elsewhere. Make checks payable to PC Magazine; U.S. currency only.

Back issues are \$8 each in the U.S., \$10 elsewhere (subject to availability). Prepayment is required. Make checks payable to PC Magazine; U.S. currency only. Mail your requests to Back Issues, Ziff-Davis Inc., P.O. Box 53131, Boulder, CO 80322-3131.

Mailing lists. We sometimes make lists of our customers available to mailers of goods and services that may interest you. If you do not wish to receive their mailings, please write to us. Include your mailing label with any correspondence; it contains information about your subscription that will facilitate processing. Please allow 6 to 8 weeks for your first issue to arrive or for any changes in your subscription to take place.

Additional information on advertised products can be requested online at www.pcmag.com/infolink.

PC MAGAZINE EXTRA

PC Magazine Extra, the interactive CD-ROM companion to PC Magazine, is available quarterly. To order (\$49.95 per year in the U.S., \$72 in Canada, \$99 elsewhere), please call 303-665-8930 in the U.S. or 303-604-7445 elsewhere. Or write to PC Magazine Extra, P.O. Box 59494, Boulder, CO 80322-8494.



PC MAGAZINE ONLINE

PC Magazine is on the World Wide Web (www.pcmag.com) and The Microsoft Network (Go To pcmagazine). We operate PC MagNet, an on-line service of ZDNet, hosted by CompuServe. (For details, see the Utilities column.) PC Magazine subscribers receive free access to our online archives.



PERMISSIONS, REPRINTS

Material in this publication may not be reproduced in any form without permission. If you want to quote from an article or use PC Magazine's logo in conjunction with an Editors' Choice designation, write Chantal Tucker or fax her at 212-503-5475; for information on reprints, please contact Ziff-Davis Reprints at 800-825-4237.

The following are registered trademarks of Ziff-Davis Inc.: DOSMark, NetBench, PC, PC DIRECT, PC Labs, PC MAGAZINE, PC MAGAZINE AWARD FOR TECHNICAL EXCELLENCE, PC MagNet, ServerBench, WinBench, Winstone, and ZD.

The following are trademarks of Ziff-Davis Inc.: Abort, Retry, Fail?, After Hours, BusinessCard, Corporate Developer, CPUmark, Extending Your Apps, Features Plus, First Looks, First Looks Plus, Lab Notes, New & Improved, OFF THE STACK, PC Bench, PC Magazine At Home, PC Magazine CD, PC MAGAZINE EDITORS' CHOICE, PC Magazine Extra, PC Magazine Marketplace, PC Solutions, PC Tech, Pipeline, Power Programming, Quick Clips, Read Only, ScreenDemos, Tech Notes, Tutor, User-to-User, WinDrain, ZDigit, ZDNet, and ZiffNet.

Other trademarks and trade names used throughout the publication are the property of their respective owners.

Copyright (c) 1998 Ziff-Davis Inc.. All rights reserved. Reproduction in whole or in part without permission is prohibited.

NOW A 350MHz PENTIUM II SYSTEM WITH A 17" MONITOR FOR JUST \$2,499.*



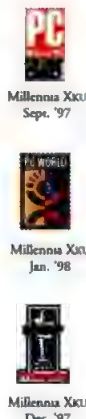
**"Power users with a yen for great 3D
will love the Millennia."**

- Millennia Xku, PC Magazine, September 1997

MILLENNIA 350 Personal Edition

- Intel 350MHz Pentium II processor (features MMX technology)
- 64MB SDRAM
- 5.4GB Ultra ATA hard drive
- 17" Micron 700 F6x, .26dp monitor (16" display)
- 82440BX chip set
- 512KB internal cache, 2MB Flash BIOS
- 3.5" floppy
- 32X EIDE variable speed CD-ROM drive
- 128-bit AGP 3D video with 4MB SGRAM
- 64 voice PCI wavetable stereo sound, stereo speakers
- 56Kbps data/fax modem†
- 104-key enhanced keyboard
- Microsoft® IntelliMouse™, USB connections
- Microsoft Windows® 95 and MS® Plus!
- Microsoft Home Essentials
- 5-year/3-year Micron Power™ limited warranty

\$2,499
Bus. lease \$87/mo.



***There is no catch; we were just seeing if you're paying attention.**

Performance without compromise. Power without speed limits. Put the pedal to the medal with Micron's intense PC powerhouse, delivering the latest in computer technology. The Micron™ Millennia® 350 is fueled by Intel's blazing-fast 350MHz Pentium® II processor featuring MMX™ technology, along with 64MB of RAM. And you're always backed by our award-winning service and support. Don't get left in the dust. Call us or visit our Web site today.

**MICRON
POWER™
WARRANTY**

5-year limited warranty on microprocessor and main memory
3-year limited parts-only system warranty
1-, 2- or 3-year optional on-site service agreement for Micron desktop and server systems
30 days of free Micron-supplied software support for Micron desktop systems; 3 optional network operating system incident resolutions included for Micron server systems
30-day money back policy
24-hour technical support

The foregoing is subject to and qualified by Micron's standard limited warranties and terms and conditions of sale. Terms and conditions of sale may vary for specific configurations. Copies of the limited warranties may be obtained on our Web site or by calling Micron.



**CALL NOW FOR
LOW MICRON PRICES.**
OTHER CONFIGURATIONS AVAILABLE
888-224-4157

†Maximum transmission speed of up to 56Kbps when downloading data and 33.6Kbps when uploading. However, actual performance is dependent upon numerous factors and observed transfer rates may be less than the maximum potential.

©1998 Micron Electronics, Inc. All Rights reserved. Micron Electronics is not responsible for omissions or errors in typography or photography. All purchases are subject to availability. Prices and specifications may be changed without notice; prices do not include shipping and handling and any applicable taxes. 30-day money-back policy does not include return freight and original shipping/handling charges, applies only to Micron-branded products and begins from date of shipment. All sales are subject to Micron Electronics' current terms and conditions of sale. Business lease prices based on 36-month lease, and consumer lease prices are based on 36-month lease. The Intel Inside Logo and Pentium are registered trademarks and MMX is a trademark of Intel Corporation. Microsoft, Windows, Windows NT and the Windows logo are registered trademarks of Microsoft Corporation. Product names of Micron products are trademarks or registered trademarks of Micron Electronics, Inc., or NetFRAME Systems Incorporated. Other product names used in this publication are for identification purposes only and may be trademarks of their respective companies.

Micron Sales Hours: Mon-Fri 9am-10pm, Sat 7am-5pm, Sun 10am-5pm (MT).

Technical Support Available 24 Hours A Day - 7 Days A Week.

Toll-free from Mexico: 95-805-708-1755

Toll-free from Canada: 800-708-1758

Toll-free from Puerto Rico: 800-708-1756

International Sales: 208-893-8970

International Fax: 208-893-7393



www.micronpc.com

Imagine

you can *manage* it all.



Solutions
Business



**Speed. Power.
Performance.
Now you can manage.**



One and only. The incomparable Micron™ ClientPro® 350 is redefining business computing. Engineered with Intel's latest 440BX chip set and the most advanced 350MHz Pentium® II processors, the ClientPro's power and performance will surpass anything you've experienced before. Suddenly, multitasking is a dream. Network support's a snap. And because Micron ClientPro ships standard with Windows NT® Workstation 4.0, you'll get a virtually crash-proof, highly secure operating system, too.

Reach for the stars. Our network-ready ClientPro desktops give you everything you've wanted in a business PC — at some of the lowest prices ever. Custom built for your business, the ClientPro line runs the gamut, from no-nonsense desktops for basic applications to the top-of-the-line, remotely-managed PCs. The ClientPro lowers ownership costs, offers easy network integration and outstanding reliability. And Micron's award-winning engineering along with state-of-the-art remote and local management features make these the desktops for success.

Your support group. A dedicated customer service team helps you custom configure your ideal system, while our award-winning technical support dream team is available seven days a week, 24 hours a day. And our ClientPro desktops are covered by an impressive warranty, so you can rest easy. Imagine the power of one person. When you're the one. Micron computers. Imagine that.

Call us or visit our Web site today.

©1998 Micron Electronics, Inc. All rights reserved. Micron Electronics is not responsible for omissions or errors in typography or photography. All purchases are subject to availability. Prices and specifications may be changed without notice; prices do not include shipping and handling and are applicable to the U.S. only. 30-day money-back policy does not include return freight and original shipping/handling charges, applies only to Micron brand products and begins from date of shipment. All sales are subject to Micron Electronics' current terms and conditions of sale. Business lease prices based on 36-month lease, and consumer lease prices are based on 36-month lease. The Intel Inside Logo and Pentium are registered trademarks and MMX is a trademark of Intel Corporation. Microsoft, Windows, Windows NT and the Windows logo are registered trademarks of Microsoft Corporation. Product names of Micron products are trademarks or registered trademarks of Micron Electronics, Inc. or Micron Systems Incorporated. Other product names used in this publication are for identification purposes only and may be trademarks of their respective companies.

ClientPro 266

Intel 266MHz Pentium II processor
(featuring MMX™ technology)
64MB SDRAM
3.2GB SMART Ultra ATA hard drive
17" Micron 700F6x, .26dp(16" display)

512KB internal L2 secondary cache, DMI 2.0 compliant,
2MB flash BIOS
24X variable speed ATAPI CD-ROM drive
3.5" floppy drive
Network adapter with 3Com Remote Wake up™ capability
4MB AGP 3D video
Microsoft® IntelliMouse™
Intel LANdesk Client Manager available
Advanced Hardware Monitoring and
Power Management features
Chassis intrusion alert
Microsoft Windows NT Workstation 4.0*
5-year/3-year Micron Power™
limited warranty

\$1,899

Bus. Lease \$66/mo.

ClientPro 350

Intel 350MHz Pentium II processor
(featuring MMX technology)
64MB SDRAM
6.4GB SMART Ultra ATA hard drive
17" Micron 700F6x, .26dp(16" display)

512KB internal L2 secondary cache, DMI 2.0 compliant,
2MB flash BIOS
32X variable speed ATAPI CD-ROM drive
3.5" floppy drive
32-bit local bus Ultra ATA hard drive controller
Expansion slots: 2 ISA, 4 PCI, 1 ISA/PCI slot shared, 1 AGP
Network adapter with 3Com Remote Wake up™ capability
4MB AGP 3D video
Microsoft IntelliMouse
Intel LANdesk Client Manager available
Advanced Hardware Monitoring and
Power Management features
Chassis intrusion alert
Microsoft Windows NT Workstation 4.0*
5-year/3-year Micron Power™
limited warranty

\$2,499

Bus. Lease \$87/mo.

*Additional Microsoft software and operating system options available.

MICRON POWER™ WARRANTY

• 5-year limited warranty on microprocessor and main memory
• 5-year limited parts-only system warranty
• 1-, 2- or 3-year optional on-site service agreement for Micron desktop and server systems
• 30 days of free Micron-supplied software support for Micron desktop systems; 3 optional network operating system incident resolutions included for Micron server systems
• 30-day money back policy
• 24-hour technical support
The foregoing is subject to and qualified by Micron's standard limited warranties and terms and conditions of sale. Terms and conditions of sale may vary for specific configurations. Copies of the limited warranties may be obtained on our Web site or by calling Micron.

Micron Sales Hours:
Mon-Fri 6am-10pm
Sat 7am-5pm,
Sun 10am-5pm (MT).

Technical Support
Available 24 Hours A
Day - 7 Days A Week.

Toll-free from Mexico:
95-800-708-1755

Toll-free from Canada:
800-708-1758

Toll-free from Puerto Rico:
800-708-1756

International Sales:
208-893-8970

International Fax:
208-893-7393

**Call now to order.
888-228-2258
www.micronpc.com**



Configured For Your Life™

Choose 098 at www.pcmag.com/infolink



SuperDisk, the SuperDisk design trademark, compatibility symbol, Imation and the Imation logo are trademarks of Imation Corp. All other trademarks are properties of their respective companies. © Imation 1998.

**Introducing SuperDisk.
To you it's a 120MB diskette.
To floppies, it's "Mr. Compatibility."**

Get a fast, floppy-compatible SuperDisk™ Drive in your next computer and give your floppies a new buddy: the SuperDisk diskette, with 120 big, friendly megabytes of room. With as much room as 83 floppies, SuperDisk™ still knows how to share. You're thinking, "How touching – but what's in it for me?" This is what: a hassle-free way to handle big and small files through a single drive.

No boxes, no cables, no nothing. SuperDisk™ Available

now in leading notebooks and PCs.

Save a little, save a lot, save the world.

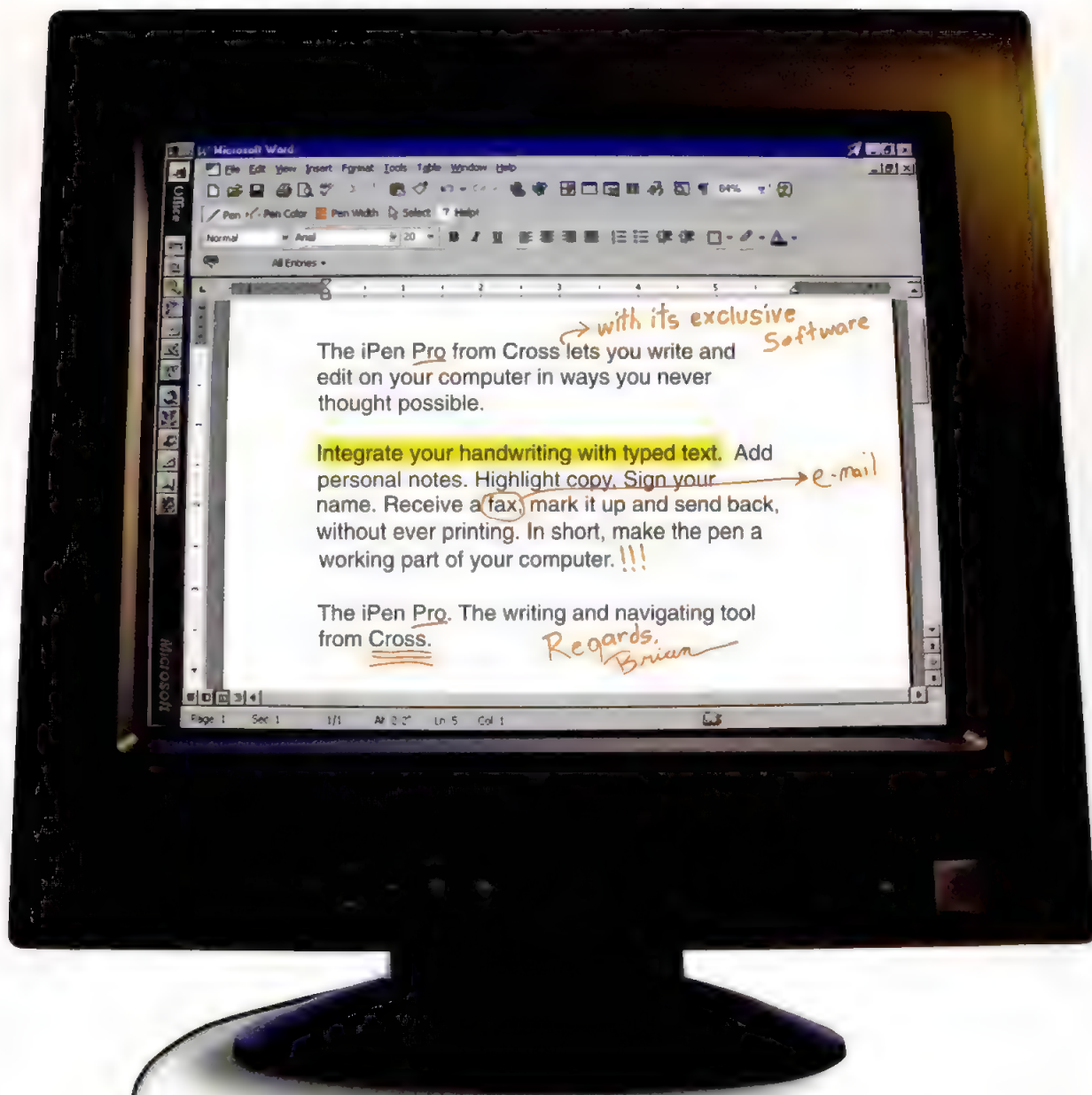


SUPER DISK™
120MB

Find out where to get SuperDisk
www.superdisk.com or
1.888.222.2294 ext.120



IMATION



It will change the way you write, edit, sign, and use your PC.



The Cross iPen Pro will virtually replace your mouse. Point, click, sign, draw and write on your PC with a digital pen. Mark up and personalize e-mails, spreadsheets, Word documents and more. You can even convert your handwriting to typed text. Get the point? Get the iPen Pro. www.cross-pcg.com.

iPen Pro



The writing and navigating tool from Cross.

©1998 A.T. Cross Company

Choose 030 at www.pcmag.com/infolink

Letters

ZIP-A-DEE-DOO-DAH

Your recent Editors' Choice of PKWare's PKZip 2.60 ("The 1998 Utility Guide," March 24) is baffling. PKZip is a high-priced compression utility that lacks many features found in Mijenix's ZipMagic and many other ZIP utilities. PKZip doesn't support any formats outside of ZIP and basic Unix formats; it doesn't allow you to view the contents of ZIP files, and despite being a 32-bit program, it lacks 32-bit functionality. Your reviewer liked that PKZip was faster in creating ZIP files, but users unzip far more often than they zip. Did you test unzipping speed? Users want transparency, and ZipMagic is the only ZIP utility that makes the ZIP process transparent.

ALEX ECKELBERRY
Executive Vice President
Mijenix Corp.

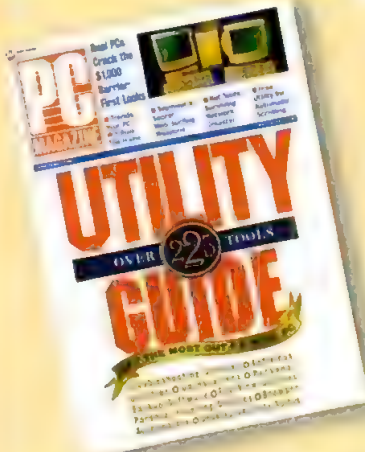
As our reviews have stated, ZipMagic offers many impressive features. It is unquestionably the only product we tested that makes file compression almost transparent. But we found that PKZip's traditional approach to file compression offered the best combination of performance and usability. Though ZipMagic supports a few more file formats, PKZip supports the most common formats. And although ZipMagic is more tightly integrated with Windows, PKZip provides right-click menus and can create 32-bit executable files. Our performance tests included both zipping and unzipping trials; in both instances, PKZip was the fastest program. Finally, no other program we tested had the same level of information on archives by default in a simple, readable format.—Ed.

Your review of WinZip was very disappointing. I have used the newest versions of both WinZip and PKZip, and WinZip is by far the superior ZIP tool. You forgot the context-sensitive pop-up menus that it provides. These pop-up menus increase productivity. Also, WinZip has a far more powerful execution.

CHARLIE HAYES
via the Internet

WHAM THAT SPAM

John C. Dvorak ("Destroying Spam for Good," March 24) bemoans the existence of spam but suggests nothing to make spamming uneconomical. I always return spam with a "nastygram." Inspect the message's e-mail header or visit the Web site advertised and you'll often find a valid e-mail return address. Sometimes the spammer lists a toll-free phone number in e-mail or on the Web site. It can be very expensive for the spammer when many people call. If just a small percentage of



*ZipMagic was impressive,
but PKZip had the best
performance and usability.*

spammers responded, spamming would decrease dramatically.

JAY STARKMAN
Atlanta, Georgia

I applaud Dvorak's antispam column, especially his naming Juno as the ISP responsible for most of the spam. I would like to suggest, however, a "superset" of his message. Not only should editors and writers identify the ISPs and the spamming companies but they should print the names of the principals of the companies and their home addresses. We could then confront them and subject them to public scolding in the same way that they have invaded our locales and homes, violating our sense of security.

PETE KIEFER
via the Internet

Dvorak is right: Spam is obnoxious and difficult to filter. But his refusal to read mail from Juno users is misguided. Juno subscribers, in my experience, are responsible for a very small portion of spam. Since I quit using AOL (because of the immense quantity of spam), I have received absolutely none in my Juno in-box. Although Juno does feature advertising, which pays for its otherwise free service, none of the advertising ever masquerades as e-mail.

JOHN GLASEL
Tenafly, New Jersey

Juno probably has no idea what some of its free accounts are being used for, but I can guarantee you that it doesn't allow mass e-mailings. I know, because I've tried, and the software has told me there are too many ad-

dresses for it to handle. Millions of legitimate e-mail users would be deprived of e-mail access altogether if Juno were to fold. I know several people who use Juno exclusively, because they can't afford the high prices of local ISPs. Yes, Juno survives only on fees it receives from advertisers who put their banners up on the screen, but that's not spam: That's the price one pays for using free e-mail.

WES MARTIN
Washington, D.C.

NOT NECESSARILY A NECESSITY

PC Magazine has been groaning about how terrible today's hardware and software are (especially Windows 95). Don't get me wrong: I recognize the failings and limitations of Windows 95 and software and hardware conflicts.

But "Necessity, Mother of Utility" by Michael J. Miller (March 24) causes me to comment. Miller says how poorly most OSs run, and although he enjoys using utilities, it's a shame that they are needed at all. He then describes a problem he had printing a database file and how arduous it was for him to resolve the problem. Though he didn't state that the fault was with the OS or the database program, that's certainly what he implied. When he finally speculated about what caused the problem, he wrote, "I suspect it may have to do with a printer utility I had tried...." I'm sure the printer application worked as intended; if you choose to manipulate an application with a utility, you run a risk.

GREG SACCONI
via the Internet

OPERA NOT ONLY IN LINCOLN CENTER

Having read Jim Seymour's column "My Secret Weapons for Web Surfing," March 24, I immediately downloaded a copy of the Opera Web browser (which, at 28.8 Kbps, took no time at all). I have found it to be all that Seymour claimed and find myself using it more and more in lieu of my usual browser, Netscape Navigator. Opera truly is simpler and faster and proves the old adage that bigger isn't always better. Now, if they can do it for a browser, do you think we'll soon see other titles? Maybe someday there'll even be a film made based on Opera's accomplishments called *Honey, I Shrunk the Software*.

HOWARD REINSTEIN
Los Angeles, California

In his glowing review of the browser Opera, Seymour left out one of its biggest advantages. Opera lets you open multiple windows within the same browser—unlike IE or Netscape. And to make a good thing even better, you can save the window settings—including a different home page for each win-

Keep it simple.

Get pieces that work together.

On one line you've got a user who can't get on the Internet.

On the other line you've got management pressuring you to justify spending.

When you're squeezed like this, between the small picture and the big, you need a system that is simpler and more useful.

A system that is naturally integrated.

We call this kind of system a Digital_Nervous_System.





A Digital_Nervous_System relies on distributed PCs and integrated software to make information flow more rich, rapid and accurate.

It's good for businesses because it helps them act faster and make more informed decisions.

It's good for users because everything is simpler. There are fewer problems. Things just work better.

And it's good for you because it gets you out of the trenches and lets you direct the battle.

Instead of dealing with someone on the third floor who can't find his memo on the server, you have the time to tailor your system to give your salespeople price-comparison capabilities in the field, for example.

The foundation of any Digital_Nervous_System is software that acts alike, works alike, thinks alike.

Microsoft® Windows®, Office®, BackOffice® and Visual Studio® provide an ideal foundation for a Digital_Nervous_System because we built them, from the ground up, to work together in the same familiar way.

They also work with an industry's worth of applications, so incorporating new software solutions is easier. Taking advantage of hardware advances is easier. Integrating Internet capabilities is easier.

The Bigger Picture. Something to think about, anyway.

Where do you want to go today?® **Microsoft®**

www.microsoft.com/digital_nervous_system/

AnthroCarts!

Configure them the way you want!



Lifetime Warranty • Dozens of Shapes and Sizes
Over 75 Accessories • Tough as Nails • Order Direct!

Call for a free catalog:
800-325-3841
6:00 AM to 6:00 PM PST M-F



Anthro Corporation
Technology Furniture
Dallas, OR 97062
Fax: (503) 325-3843
Japan: 03 (Tokyo) 3947-2733
www.anthro.com



Since 1984. Prices from \$299. GSA contract. Available for OEM applications.

Letters

dow—in a profile. When I start Opera, I get my news-summary page, sports site, local news, and industry update with nothing required on my part. Try doing that with your 20MB browser.

CHARLIE MUNRO
via the Internet

Corrections and Amplifications

In the First Looks review of the HP LaserJet 3100 ("Faster Multifunction," April 21) we incorrectly stated that the Brother MFC-4550 has 400-dpi optical scanning resolution. In fact, it has 200-dpi optical and 400-dpi interpolated maximum scanning resolution, and the LaserJet 3100, with 300-dpi optical and 600-dpi interpolated maximum scanning resolution, has a higher scanning resolution.

In the First Looks review of the Toshiba TLP-511A MediaStar projector ("Lights, Camera, Project!", April 7), the contact phone number for consumers is incorrect. It should be 800-346-8672.

In our March 24 feature "The 1998 Utility Guide" (p. 223), we incorrectly reported that Diskeeper for NT moved active files toward the center of the disk to improve performance by decreasing head-movement time. This is actually a feature of PerfectDisk NT, which moves less frequently used files to the edges of the disk and more active files toward the center.

In the Trends/Internet story "A Sensible Message" (March 24), we printed an incorrect phone number for IMS Direct. The correct number is 800-924-8167.

In "To Write or Rewrite?", our review of CD-R and CD-RW drive bundles (March 10), we tested the TEAC CD-R55S with the included Adaptec Easy CD Pro and DirectCD mastering software. TEAC has since switched to CeQuadrant's JustAudio! and packet-writing software.

In the Summary of Features table for "High-End Notebooks" (January 20), we incorrectly listed the Dell Latitude CP M233ST's rated battery charge time while off as 1 hour 40 minutes. It is actually 1:04.

How to Contact Us

We welcome your comments and suggestions. When sending e-mail to Letters, please state in the subject line of your message which article or column prompted your response.

E-MAIL pomag@zd.com

FAX 212-503-5799

MAIL Letters, PC Magazine

One Park Avenue

New York, NY 10018-5802

All letters become the property of PC Magazine and are subject to editing. We regret



that we cannot answer letters individually. To send submissions for PC Solutions, please see the sidebar "How to Contact Us" on the last page of that column.

The IQ Test.

Check the box to indicate which product offers a better value for the price.

Product Name:	ZipPlus™	SparQ™	ZipPlus by Iomega®	SparQ by SyQuest™	Same
Drive Size:	100 Megabytes	1,000 Megabytes	☐	☐	☐
Drive Price:	\$199	\$199	☐	☐	☐
Cartridge Size:	100 MB	1,000 MB	☐	☐	☐
Cartridge Price:	10 Disks (1GB) = \$129	1 Disk (1GB) = \$39	☐	☐	☐
Seek Time:	29 ms*	12 ms*	☐	☐	☐

Product Name:	Jaz™	SparQ™	Jaz by Iomega	SparQ by SyQuest	Same
Size:	1 GB	1 GB	☐	☐	☐
Drive Price:	\$299	\$199	☐	☐	☐
Cartridge Price:	\$124	\$39	☐	☐	☐
3 Cartridge Price:	\$299	\$99	☐	☐	☐

Got an aptitude for spotting value? Then you've probably deduced that the SparQ removable cartridge hard drive from SyQuest gives you a lot more for your money than ZipPlus or even Jaz. If you want to increase your storage capacity (and show off your genius) make the smart move to SparQ. To find a retailer near you, and also test your storage savvy to win some great SyQuest merchandise, visit our web site at www.syquest.com/IQ



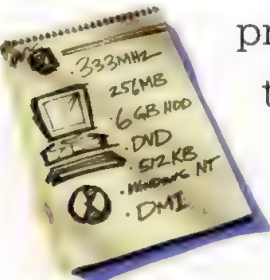
*Seek times based on SyQuest and Iomega corporate data. ©1998 SyQuest Technology, Inc. SyQuest is a registered trademark and SparQ and the SparQ logo are trademarks of SyQuest Technology, Inc. ZipPlus and Jaz are trademarks and Iomega is a registered trademark of Iomega Corporation. Price comparison based on MSRP of Zip Plus, Jaz and SparQ from published distributor price ads February 1998.

Choose 315 at www.pcmag.com/infolink

Replace motherboard Then go on to perform

Introducing Toshiba's new Equium™
7000 series with the Intel Pentium® II

processor. Built into
this new series is
a unique Instant
Access door that
lets you reach
the motherboard
through the side
of the chassis. No other computer
maker has anything like
it. Which means



*Just give us your list.
We can custom-configure
desktops to your exact specs
of memory, processor
and depth of features.*



that without
removing the monitor, this new patent-pending
design lets you replace the motherboard in 30
seconds! Get in, get out, get back to work. This
modular design is just one more example of how

© 1998 Toshiba America Information Systems, Inc. *Price for Equium 7000S part #1043U-0000: 233MHz, 32MB SDRAM, 2GB HDD, 1.44MB FDD, Intel Ethernet Network, Windows 95. Monitor not included. **Standard features for the Equium 7000 series. 130 second time assumes no external system cables are connected to the motherboard. All prices, specifications and availability are subject to change. Reseller prices may vary. Equium is a registered trademark of Toshiba America Information Systems, Inc. The Intel Inside Logo and Pentium are registered trademarks and MMX is a trademark of Intel Corporation. All other products indicated by trademark symbols are trademarked and/or registered by their respective companies.

ard in 30 seconds. orm other miracles.



*An in-depth, built-in
Expert Intelligent Help
System solves user
problems on the spot.
Automatically or tutorially.*

Toshiba is
taking the
desktop



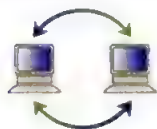
*Limited workspace? Meet the first
computers to function as desktops,
towers, even wall-mounted units.*

seriously. Other examples?

Flexibility in any working
environment—your Equium



can operate as a traditional desktop, a vertical
tower, or as a wall-mounted unit for any wall or
cubicle. Consistency of components means these



*Key components for both Equiums
are 100% interchangeable.
As for qualification? Test one,
and you've tested them all.*

systems share parts, so you can cut
qualification

times. They even feature a self-
fixing Expert Intelligent Help
System to reduce calls to your
help desk. The most flexible,
cost-efficient corporate PCs
on the market. They're not
miracles. They're Toshiba.

For more details, give us a click at

<http://computers.toshiba.com>, or simply
call us toll-free today at 1-888-598-7802.

EQUIUM.

Starting at
\$1299*

Custom Configuration Options for 7000 Series:

- 233MHz, 266MHz, 300MHz or 333MHz Intel Pentium® II processor
- 512KB cache**
- 16MB, 32MB, 48MB, 64MB or 128MB SDRAM (expandable to 256MB)
- 2GB, 3GB, 4GB, 6GB or 8GB HDD
- 24X or 32X CD-ROM, DVD or none
- 3.5" 1.44MB FDD or none
- Intel EtherExpress™ PRO 10-100 network interface or none
- Expert Intelligent Help System**
- Intel LANDesk® Client Manager**
- DMI 2.0**
- Security features: chassis intrusion alert and password protection**
- Windows® 95 or Windows NT®
- 3-year limited warranty, 1st year on site**
- Optional TekBright monitors (15", 17")

In Touch with Tomorrow
TOSHIBA

Trends



Java Springs Eternal

With Java at the crossroads, Sun has an arsenal of initiatives.

As electronic commerce, extranets, and the Web continue their march forward, this year represents a critical time for Sun Microsystems' Java. The sense of urgency was more than apparent at the recent JavaOne conference in San Francisco, where Java's chief architect, James Gosling, said that Java will see rapid improvements in speed, stability, and flexibility this year.

Sun also announced many new application programming interfaces (APIs) for Java as well as a new JavaOS tuned for consumer devices. Much action surrounded the arrival of a specification for Enterprise JavaBeans, which Sun designed to deliver transaction smarts to all kinds of business and commerce applications. At the same time, Hewlett-Packard and Microsoft are coaxing Java in directions dissonant with Sun's orchestrations.

JAVA FOR TV, PHONES, AND CARS

The important announcements at JavaOne, which played to packed crowds of developers, centered on the new APIs to extend Java's functionality and the new JavaOS for Consumers, which Sun designed to bring Java to interactive TVs, Web phones, car navigation devices, and hand-held computers. According to market researchers at IDC, such non-PC appliances will increase world-

wide by 130 percent per year until 2001.

"Sun's vision is the utility model of computing, where information and services are delivered to a wide range of devices the way that utilities are delivered to your home—from a large server through a fat pipe to a group of thin clients powered by JavaOS," said Jim Hebert, general manager at Sun's Embedded Systems Software group.

Sun also released the specifications for Embedded Java and Enterprise JavaBeans, as well as PersonalJava. Enterprise JavaBeans—a component framework for transaction-enabled server-side Java—has been eagerly awaited, as it promises to usher in all kinds of e-commerce and business applications. IBM, Netscape, Oracle, and others have announced plans to build Enterprise JavaBeans into their server products.

Sun plans to build a

version of PersonalJava for Windows CE and to build new APIs for sound, drag-and-drop across platforms, faster memory allocation, and monitor speedups.

Gosling is aware that many applications written in Java have not been running as quickly as applications written in other languages, an issue that Microsoft has been vocal about. He also concedes that the speed of compiling Java applications has lagged, disenchanting some developers. But he noted that some of the just-in-time compilers, such as Symantec's JIT 3.0, are approaching the compilation speeds of development tools for the C programming language. "This year is the year that the performance problem goes away," Gosling said.

"DO NOT USE MICROSOFT PRODUCTS"

Also at JavaOne, Sun CEO Scott McNealy took broad swipes at Hewlett-Packard and Microsoft for producing their own versions of Java. McNealy went so far as to tell the crowd, "Do not use Microsoft products." JavaSoft president Alan Baratz added, "Industry titans who think they can build industry technology in a closed room these days and promise that one day it will become open are missing the boat."

Amid the flurry of announcements and war cries from Sun, can Java finally become the portable, ubiquitous, and efficient solution that Sun has promised it will be? According to Tom Johnston, Microsoft's group

product manager of platforms, Java is likely to end up being just one part of a large set of tools that developers use for Internet applications. "Time to market, performance, and many other issues figure into what tools developers choose, and they'll end up picking different tools for different jobs," Johnston said.

For Sun's Gosling, the same two issues—speed of applications development and performance—head the long list of objectives for Java's evolution this year.

—Sebastian Rupley

The Evolution of Java

Among the recent announcements from Sun's JavaSoft division are

JavaOS for Consumers, designed to bring Java to car navigation equipment, hand-held computers, phones, and TVs.

A specification for Enterprise JavaBeans, designed to usher in a wave of cross-platform business and e-commerce applications.

Several enterprise-focused APIs, including JavaMail 2.0 and a Java Database Connection 2.0 API.

A Java Message Service API for publish-and-subscribe messaging systems, and a Java Transaction Service API.

Performance enhancement APIs, including ones for faster memory allocation and monitor speedups.

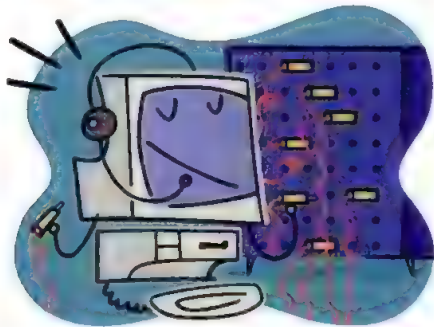
JavaOS for Business, a limited-function OS for corporate users, from IBM and Sun.

Web Phones Untangled

A global standard gets thumbs up.

One year ago, Web telephony pioneers were worried about standards—the protocols that would let consumers using different Web phones communicate with each other. Without standards, the two parties to an Internet phone call have needed the same software.

Now that the International Telecommunications Union has ratified the first major standard for Internet telephony—H.323—a few developers have released compliant versions of their voice-over-IP (Internet Protocol) applications, including Intel Internet Video Phone and Microsoft NetMeeting. Scores of



other companies are set to follow this spring.

But Web phones face other obstacles to mainstream acceptance. "Part of the problem with Web phones is that they ask consumers to act differently than they're used to," says Chris Mines, an analyst at market research firm Forrester Research. People are used to talking into a handset's microphone, not to a computer.

Compared with handset-to-handset services over the Internet, computer-based Web phones are kids' stuff, says Mines. "Internet telephony from PC to PC is analogous to ham radio. It's great for enthusiasts," he comments. Voice over IP, he adds, will have serious mainstream applications seven to ten years down the road.

That's why Web phone developers, such as VocalTec, are beginning to focus on more than just fun consumer products. Services such as billing and metering that are tailored for telecommunications carriers are becoming attractive aspects of the market, says VocalTec associate product manager Scott Buckley. "The future of IP telephony is in providing telco-quality solutions," Buckley says.

Meanwhile, the need for Internet telephony standards hasn't gone away. But the focus now is on Internet gateways, which will also support H.323. Cisco Systems, Ericsson, and Lucent Technologies—the big players in the gateway market—need the standards to make their solutions interoperable.—Angela Hickman



Deconstructing 3-D Graphics Tests

PC MAGAZINE LABS' DECISIONS REGARDING certain graphics board features have created quite a stir in the industry. The controversy centers around the rendering of quality features such as anti-aliasing (a technique for minimizing or smoothing jagged edges), MIP mapping (a texture-mapping method that improves the appearance of textured objects as they move within a 3-D scene), and trilinear filtering (a technique for MIP-map filtering used to improve realism).

For our First Looks Online evaluation "AGP Graphics Boards" (www.pcmag.com/firstlooks/9803/f980311a.htm), we tested the new Real 3D StarFighter AGP using our 3D WinBench benchmark test program. For these tests, before running the actual benchmark tests measuring frame rates, we evaluate hardware rendering. We play several scenes—each attempting to engage a hardware rendering feature, such as specular highlighting, alpha blending, anti-aliasing,

and trilinear filtering. At the end of each scene, the technician compares one frame with a good frame and a bad frame. The board fails if the frame isn't substantially as good as the high-quality frame.

Boards get reduced scores when one test or more can't be fully implemented by hardware.

Real 3D's StarFighter implements *sort-independent anti-aliasing* not only with hardware logic but also with driver software. Those who favor the combination approach say that the hardware and the driver software make up the graphics subsystem and that if the consumer benefits, the implementation shouldn't matter. The other faction believes that hardware alone should implement such image-enhancement features. They argue that bloating software drivers to perform enhancement violates the principles of Direct3D and can make a system unstable. The StarFighter hardware supports only *sort-dependent* anti-aliasing,

yet its software allows a partial implementation of *sort-independent* anti-aliasing. We believe that the driver software should not explicitly present features that the hardware doesn't support.

Judging from the final images on our anti-aliasing *quality* tests, we initially decided that the StarFighter's technique worked. But the two *performance* tests that require sort-independent anti-aliasing showed that it didn't work well at all. Because of the combination hardware/software method and the poor job of anti-aliasing in our test scenes, we concluded that the feature worked incorrectly and didn't give the StarFighter credit for this operation.

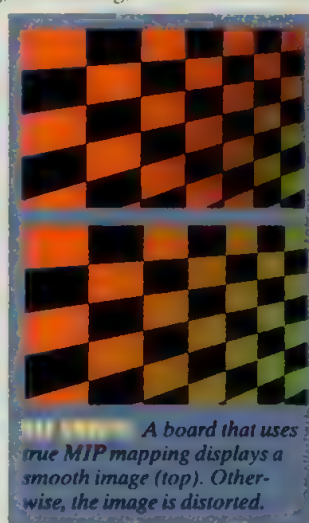
For texture mapping, graphics boards tend to implement either per-polygon or per-pixel MIP mapping. Per-polygon MIP mapping yields lesser quality, but it's easier to implement and works fast in hardware. The Rendition-based Hercules Thriller uses per-

polygon MIP mapping (as do Nvidia RIVA 128-based products), and we have historically given credit to this method. Of course, vendors that implement per-pixel MIP mapping feel that we should fail per-polygon implementations. Trilinear filtering requires per-pixel MIP mapping or, as an alternative, per-triangle MIP mapping with driver-based triangle subdivision, with multiple blending passes, or with both.

Real 3D claims that the StarFighter performs trilinear filtering, but the

board actually uses an inferior, faster technique: *level-of-detail dithering*. This approach is better than nothing, but it produces noticeable dithering patterns in objects that move into the distance. We accepted this approach, although Real 3D's competitors would have rejected it.

There's no doubt that evaluating 3-D quality is tricky. For our next graphics board story, we'll provide you with our quality tests' guidelines and results.—Nick Stam



The XML Invasion

Extensible Markup Language will make the Web more flexible and structured.

The Web is getting set for a makeover. Touted as "the second coming of the Web" by the World Wide Web Consortium, XML (Extensible Markup Language) is an important new complement to such architectural underpinnings of the Web as Java and HTML. Proponents claim that it can free the Web from dependence on inflexible document types and revolutionize Web searching, Web databases, and Web information exchange.

XML is designed to tag the locations of critical information in Web documents. It's based on SGML, a standard for defining descriptions of the structure and content of electronic document types. Using elements such as text parsing, tree management, and formatting, XML tags are a sort of advanced, electronically searchable card catalog for a "library" of Web pages. (For a more technical look at XML, see "Structuring Data with

XML" in this issue's PC Tech section.)

For example, you might XML-tag a page containing a Shakespeare play so that not just the page but precise passages in it and references associated to it could be searchable by a search engine or a database. Information in HTML-based table format on the Web now (such as stock-price tables) can also be XML-tagged, so spreadsheets and databases will easily be able to import, format, and sort such tables.

Microsoft, Netscape, and other developers are currently working on XML browsers. DataChannel, Interleaf, and Microstar Software announced new XML publishing tools at the recent XML Conference 98 in Seattle, and Chrystal Software has introduced a product for XML-based content management. XML-tagged content is even appearing at various sites, such as Jon Bosak's Shakespeare site

(<ftp://sunsite.unc.edu/pub/sun-info/standards/xml/eg/>).

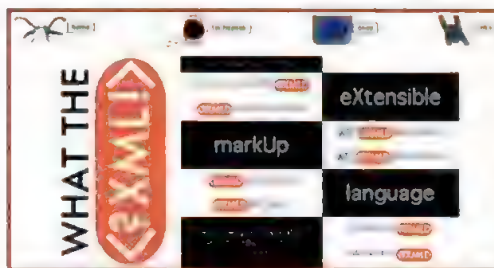
In addition to tagging page content, XML

can help create so-called meta-content to wrap around entire documents. DataChannel is working on a product in this category: RIO.

It's similar to software for managing distributed data on intranets, such as BackWeb. But it will enable the use of XML-based descriptors for such data and XML-based

metacontent for describing the content of intranet pages.

"XML promises to bring structure to Web-based data," says Thomas Powell, president of Powell Internet Consulting. That may be true, but users will have to wait for browsers and other products to incorporate XML functionality and for designers to XML-tag a sea of Web pages.—Sebastian Rupley



The XML FAQ site at www.geocities.com/SiliconValley/Peaks/5957/xml.html explains XML.

JAKE KIRCHNER

Web Sports: Quokka, Yes; Cosell, No

Raise your hand if you're a sports nut. Okay; that means you probably saw at least 40 or 50 of the games of the NCAA men's basketball tournament and maybe a few of the women's games—just as I did. In the process, you no doubt experienced "up close and personal" what I call the Cosell effect.

Howard Cosell's insistence on wrapping sports in "human drama" and—worse—on focusing on the announcer helped make sports a worldwide industry bringing in \$150 billion a year. In the process, he ruined sports viewing for real fans.

The Cosell effect explains why every time you see a basket on TV, you then see a shot of a player's jubilant parent and a shot of an anxious coach. Then, after you hear about the player's bedridden grandmother, you watch 2 minutes of auto and beer commercials whose frogs and lizards are far more familiar than any player on the court. Why shouldn't they be? They get more air time.

The nadir of the Cosell era was the Winter Olympics in Nagano. CBS's insistence on local color and human-interest stories, calculated to attract millions of sometime sports viewers, did nothing but chase fans from the tube. Many of them fled to the International Olympic Committee's Web site (www.olympic.org), which delivered a compelling mix of images and data to millions of visitors.

A small company called Quokka Sports developed the Olympics site—which is still worth visiting, by the way. Quokka was founded by veterans of the *one Australia* team that raced in the 1995 America's Cup challenge and is named after a small, kangaroo-like marsupial.

Headquartered in San Francisco, Quokka is now (you'll excuse



the phrase) making a big splash with a site covering the Whitbread Round the World Race, sailing's most grueling challenge (www.whitbread.org). By capturing and presenting a fascinating mix of audio, video, still images, e-mail, and race statistics and other information, Quokka pulls you into the cockpits of boats thousands of miles out at sea. The race participants, rather than the nattering knuckleheads with microphones we usually have to suffer, become the analysts and celebrities who present the action.

Quokka refers to its method as *total sports immersion* and argues—convincingly—that for many sports, understanding what's going on from the stands or your sofa is almost impossible. Auto racing is a good example. Sitting in the stands, all you experience is a loud blur of cars flashing by, exciting enough but hardly informative. Yet if you could experience the race from the pits, you could hear the drivers' conversations with their crews, follow the race on the crews' computers, check the conditions of the cars on their monitors, and be privy to the strategies of the teams. All that information—those *digital assets*, in Quokka's words—can accompany still and video images of the race.

"For many sports it is more satisfying to watch the sport through the eyes of the computer than live," says Quokka president and CEO Alan Ramadan. Although the approach won't necessarily take back big-time team sports from the commercial grip of traditional broadcasting companies, many sports (including golf and cycling) are ripe for it. It's a leap forward from the statistics-and-analysis approach of more established sports Web sites. And best of all, in the land of Quokka, there's no Dick Vitale.



The new
56K modem
standard is here.

Now
it's safe for everyone
to use a Shotgun.

SHOTGUN
TECHNOLOGY

DIAMOND
MULTIMEDIA

Why is everyone fired up over the new 56K standard? Because now, Diamond modems not only support the new ITU V.90 standard, but they include Shotgun technology—the double-barrel approach to increasing your modem speed up to 112K!

Shotgun is Diamond's exclusive technology that bonds together two modems to work over two ordinary phone lines. The result? One powerful Internet connection. For instance, keep your existing 33.6K modem, add a speedy Shotgun-enabled SupraExpress™ 56K modem

SHOTGUN to your PC, and get speeds up to 89.6K. Better yet, two 56K Diamond modems deliver up to 112K!

Since Diamond's award-winning modems all comply with the new 56K V.90 standard (as well as Rockwell's K56flex technology), you're guaranteed high-speed Internet provider support today and well into the future. Best of all, Shotgun technology assures you of even speedier Internet connections!

So now, the safest way to faster downloads is to pick up a Shotgun.



GRAB A SHOTGUN-LOADED DIAMOND MODEM TODAY.

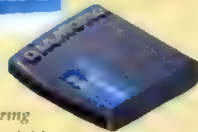
The mandatory waiting period for a Shotgun is over! Diamond's new 56K modems with Shotgun technology are available in stores now. Just look for the Shotgun logo on these products:



Products incorporate technology provided by
Semi-conductor Systems, Inc.

SupraExpress 56K

- Internet access to 56K
- Award-winning engineering
- Speakerphone model available
- Combine two modems for speeds to 112K!



SupraSonic® II

- Internet access up to 112K!
- Two 56K modems integrated on a single board



- Easy two-wire installation
- Automatically releases line for other uses

Enter the Shotgun Sweepstakes
by visiting our website at
<http://www.diamondmm.com/shotgun>

© 1998 Diamond Multimedia Systems, Inc. All rights reserved. Diamond, SupraSonic, and the Diamond logo are registered trademarks of Diamond Multimedia Systems, Inc. SupraExpress, Shotgun, and the Shotgun Technology logo are trademarks of Diamond Multimedia Systems, Inc. Rockwell and the Rockwell logo are trademarks of Rockwell International. All other trademarks or registered trademarks are the property of their respective owners. Though these modem/modem technologies are capable of 56Kbps/112Kbps download performance, line impairments, such as telephone line noise, and other external technological factors currently prevent maximum 56Kbps/112Kbps connections. This modem is designed with the specifications released by the ITU in February 1998. The actual standard will not be fully approved until the ITU voting procedure (projected for September 1998).

SITUATION:

“PointCast needed high-performance and reliable systems to operate in our mission critical environment”

— Director of PointCast Networks,
PointCast, Inc.



SAG STA Pentium Pro 200



SAG STF 166 Pentium



SAG STF 180 Pentium



SAG Dual Pentium Pro RAID 5 Server



7/1/97 - 2/1/98 Web Server



Web Server 1998

SAMPLE WORKSTATIONS – ALL SYSTEMS CUSTOM BUILT

100%

SIA DUAL PII 400/6X

CAD STATION

- 1 Intel Pentium II 400MHz Processor
- 512Kb Cache, Upgr. To 2 CPU's
- 64Mb SDRAM
- Slots 4 PCI 3 ISA BX Chipset
- 9Gb LVD 10,000 RPM ST39102LW (5 Drs)
- Adaptec 2940UW SCSI LVD
- Diamond Fire GL 8Mb Video
- Sony 32x CD-ROM; Keyboard, Floppy, Mouse
- Full Tower Chassis

\$3233

40Mb Symmetric MX Open GL Card 4633

SIA DUAL PII 333/6X

POWER STATION

- 1 Intel Pentium II 350MHz Processor
- 512Kb Cache, Upgr. To 2 CPU's
- 64Mb SDRAM
- Slots 4 PCI 3 ISA 1 AGP BX Chipset
- 9Gb 7200 RPM IDE Drive ST39140A
- Sony 32x CD-ROM
- #9 Revolution 8Mb Video
- Keyboard, Floppy, Mouse
- Mid-Tower Chassis

\$2089

9Gb LVD 10,000 RPM ST39102LW (5 Drs) Solution 2970

SIA PII 333/6X

- 1 Intel Pentium II 350MHz Processor
- 512Kb Cache
- 64Mb SDRAM
- Slots 4 PCI 3 ISA BX Chipset
- 6Gb 7,200 RPM Ultra DMA Drive
- Toshiba 32x CD-ROM
- NEW Intel Express 3D 4Mb Video
- Keyboard, Floppy, Mouse
- Mid Tower Chassis

\$1750

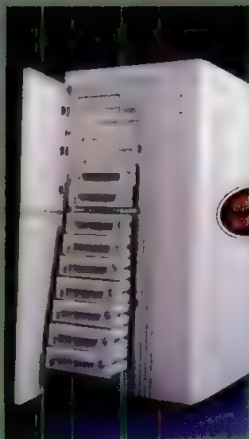
4 5Gb 10,000 RPM Solution 2235

SIA CELERON CLIENT 266-8

- 1 Intel Pentium II 266MHz Processor
- 0Kb Cache
- 64Mb SDRAM
- Slots 4 PCI 3 ISA BX Chipset
- 2.1Gb Ultra DMA Drive
- Sony 32x CD-ROM
- #9 Reality 4Mb Video
- Keyboard, Floppy, Mouse
- Desktop Case

\$895

*S&T on-line available. License options available. Returns may be subject to restocking fee. RMA # must be acquired. Some devices have not been approved by the Federal Communications Commission.



SAMPLE SERVERS – ALL SYSTEMS CUSTOM BUILT



STC 2000 PRO 2X/512K CACHE

- 1 Intel Pentium Pro 200
- 512Kb Cache, Up to 4 CPUs
- 64MB ECC Exp. To 2GB
- Slots (6) PCI (4) EISA
- 18GB UVD 10,000RPM (5.0ms)
- Adaptec 2940UW UVD
- #9 Reality 4Mb Video
- Intel 10/100 Ethernet
- Sony 32x CD-ROM, Keyboard, Floppy, Mouse
- 12 Bay Tower Chassis, 600 Watt Red. Power
- Server Management Software & Alarm Avail.
- Rackmount Solution Available

\$6488

STF DUAL PR 350/BX RAID 5

- 1 Intel Pentium II 350MHz Processor
- 512Kb Cache, Upgr. To 2 CPUs
- 64MB SDRAM
- Slots 4 PCI 2 ISA BX Chipset
- Integrated Adaptec UW SCSI
- Integrated Intel 10/100 Ethernet
- Integrated Video
- Intel Server Mgt Hardware
- Q(3) - 4.5Gb 10,000 RPM Removable SCSI
- Raid 5 3 Channel controller 16Mb Cache
- Sony 32x CD-ROM
- Keyboard, Floppy, Mouse
- 12 Bay Tower Chassis 400 Watt Power

\$6099

STF DUAL PR 400/BX

- 1 Intel Pentium II 400MHz Processor
- 512Kb Cache, Upgr. To 2 CPUs
- 64MB SDRAM
- Slots 4 PCI 2 ISA BX Chipset
- Integrated Adaptec UW SCSI
- Integrated Intel 10/100 Ethernet
- Integrated Video
- Intel Server Mgt Hardware
- 9Gb UVD 10,000 RPM ST39102LW (5.0ms)
- Sony 32x CD-ROM
- #9 Revolution 8Mb Video
- Keyboard, Floppy, Mouse
- 12 Bay Tower Chassis 400 Watt Power

\$3587

SAMPLE RAID 5 SUBSYSTEMS – ALL SYSTEMS CUSTOM BUILT



STC 2000 RAID 5

- 2-Channel RAID UW Controller
- 8 Hot-swappable Drive Bays
- 2-300 Watt N+1 Red. Power Supplies
- 32 MB Cache
- Internal temperature status
- Power supply status
- Cooling fan status
- Visual and audible alarm

18GB Solution

Q: (4) 4.5GB 10,000RPM UW HD: \$6795

27GB Solution

Q: (3) 9.1GB 7200RPM UW HD: \$6820

54GB Solution

Q: (3) 18GB 7200RPM UW HD: \$9125

STC2000 20 BAY SINGLE

- 4 Channel RAID 5 UW Controllers
- 20 Hot Swappable Drive Bays
- 8 - 230 Watt Hot Redund. Power Supplies
- 32MB of Cache
- Internal temperature status
- Power supply status
- Cooling fan status
- Visual and audible alarm

144GB Solution

Q: (8) 18GB 7200RPM UW HD: \$20,285

72GB Solution

Q: (8) 9.1GB 10,000RPM UW HD: \$15,910

32GB Solution

Q: (8) 4.3GB 7200RPM UW HD: \$12,995

STC 2000 20 BAY

- Active/Active Controllers
- Q: (2) 4 Channel RAID 5 UW Controllers
- 8 - 230 Watt Hot Redund. Power Supplies
- 128MB of Cache
- Internal temperature status
- Power supply status
- Cooling fan status
- Visual and audible alarm

144GB Solution

Q: (8) 18GB 7200RPM UW HD: \$25,560

72GB Solution

Q: (8) 9.1GB 10,000RPM UW HD: \$21,359

32GB Solution

Q: (8) 4.3GB 7200RPM UW HD: \$17,495



GSA Schedule: GS-35F-3103D

RESOLUTION:

“I made the call.”

1-800-989-3475

8:30am - 7:00pm EST

Choose 309 at www.pcmag.com/infolink

www.sagelec.com • 5 Year Limited Warranty
790 Turnpike Street • North Andover, MA 01845 • Fax 978.689.0180

SAGE
ELECTRONICS
Total Solution Company



SAMSUNG

monitors

David Carson

Graphic Artist

New York, NY

The original
concept designer for
Raygun magazine.
The End of Print and
Zndisight are two
books about his work.

Favorite Web Site:

sidewalk.com

Monitor of Choice:

Samsung's new 900p



The 900p

The newest member
of Samsung's family of
SyncMaster™ monitors
19" FST (18" viewable)
Resolutions up to
1600 x 1200 @ 75Hz
Drop-down panel

THE NEW SKETCH PAD

MY MONITOR IS HOW I COMMUNICATE

"I'm self-taught, so I never learned what I'm not supposed to do. I learned to rely on intuition - as a way of working, it's an artist's most important tool. Intuition makes you step inside yourself. It incorporates the artist, makes the work more personal - it prompts experimentation. I want to be able to see what I'm thinking, quickly. Samsung's new 900p

monitor is the best I've found. The color, the resolution and the fidelity give me more solutions with the clarity and accuracy I need to see. Rapid Viz (rapid visualization) is crucial. I used to sketch my ideas, but now, my monitor and my intuition are where and how I start." For more information, call 1 800 so simple or visit our web site at www.sosimple.com



Best 5 Star
Product of the
Year 2 Category
Jan. 1998 21GLs



Best Product of
the Year 1997
Jan. 1998 700b



Editors Choice
Jan. 1997 41ve



Aug. 1996 2 GLs
Sept. 1995 7GLs



Oct. 1997 700b
Oct. 1996 7GL
Sept. 1995 7GL



Monitor Partner of the Year
996 1997 998



June 1997 21GLs



May 1997 21GLs



Aug. 1996 21GLs



Feb. 1997 15GLs
July 1996 17GLs
May 1996 20GLs

DESKTOP PCS

New PCs Pack a Punch

Intel has been busy this month. On the heels of the Mobile PII processor release come the desktop PII 350-MHz and 400-MHz processors with the Intel 440BX AGP chip set and 100-MHz system bus.

As seen in "400-MHz Pentium PCs," this issue's roundup of the first nine next-generation PCs, the increase of the system bus speed from 66 MHz to 100 MHz—coupled with a faster processor and a graphics-friendly chip set—has significantly raised the bar in terms of power and performance in the PC market. Given the high-end power-user market, these new, reasonably priced PCs will be in a position to offer stiff competition to systems such as Unix workstations and Macs.

In addition to the systems reviewed in that story, ProGen Systems (800-848-8777, www.progen.com), DTK Computer (800-289-2385, www.dtk.com), and Everex Systems (800-383-7391, www.everex.com) have also announced their plans for 350- and 400-MHz systems.

ProGen is introducing the new Intel technology into their Polaris desktop line. Both the \$1,949 Polaris PII350 and the \$2,599 Polaris PII400 have the power to support leading-edge 3-D, full-motion video, and a range of business applications. The Polaris PII350 comes loaded with Microsoft Windows 95 and features a 6.4GB Ultra DMA hard disk, 64MB of RAM, and a 17-inch ProGen monitor. Meanwhile the Polaris PII400 of-

fers Windows NT 4.0, an 11.5GB Ultra DMA hard disk, 64MB of RAM, and a 17-inch Panasonic monitor. For an extra



NEW WARE: Systems from ProGen (above), DTK (right), and Everex (above right).

\$79, ProGen will install a 3Com 10/100 network card to function with the ProGen's already present management features, including DMI 2.0 support and Intel LANDesk Client Manager 2.0.

ProGen packs the Polaris line with Intel's Express 3D graphics board with 8MB of SGRAM, a 32X CD-ROM, a 56K telephony modem, and an Aureal PCI 32-bit A3D sound card with

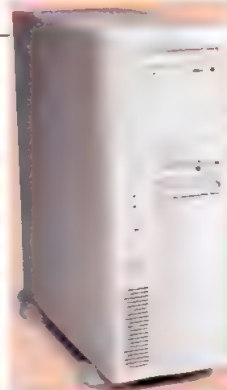
80W PMPO stereo speakers and sub-woofer. Microsoft Office 97 Small Business Edition is bundled with the system. The Polaris has plenty of room for expansion—including a maximum of 384MB of system memory, four open drive bays, and four available slots (two PCI, one ISA, and one shared), and it is backed by a three-year limited warranty.

DTK's venture into the new high end of PCs is the new high end of PCs is the **Apri-80M/P350**. Like Pro-



Gen, DTK hopes to win over high-end business users who want flexibility and speed. For a few dollars more than ProGen's Polaris, the \$2,699 Apri-80M comes standard with a 9.1GB Ultra DMA hard disk, an Intel 10/100 network card, and the popular Creative Labs AWE-64 sound card with JUSter speakers (but no subwoofer).

The unit also comes with a 350-MHz Pentium II processor, 64MB of SDRAM, Windows 95, a 32X CD-ROM drive, a Real 3D Starfighter, 4MB of SGRAM, an AGP graphics card, a 56K modem, Microsoft Office 97 Small Busi-



ness Edition, and a 17-inch monitor. The system features two free PCI slots, one free ISA slot, one free shared slot, four open drive bays, and four DIMM sockets, which let the system upgrade to as much as 1GB of RAM. DTK plans to complement the unit's ability to perform power-hungry business applications with DMI 2.0 support in addition to Intel LANDesk 2.0 and a two-year parts-and-labor warranty.

Everex is taking a somewhat different approach to the marketing of its new 400-MHz system. The vendor's **StepStation 2** comes in two flavors. The \$3,275 Windows NT 4.0 system is targeted at corporate markets and comes equipped with an Intel 10 Base-T/100 Ethernet network card, while the \$3,200 SOHO-targeted Windows 95 system comes with a 56K modem. Standard with both systems are 128MB of

SDRAM, an 8GB hard disk, a Creative Technology PC-DVD, a Creative Labs Dxr2 decoder card, a Creative Labs AWE-64 Sound Blaster sound card, and a 3D Labs Permedia 2 AGP with 8MB of SGRAM. Also included with the StepStation 2 is a 17-inch monitor and speakers.

Flexible expandability is there, too. Each chassis provides four open drive bays and three open DIMM sockets for upgrades of up to 1GB of system memory. The Windows NT model offers one free ISA slot and two free PCI slots, while the Windows 95 model has three free PCI slots. Lotus SmartSuite 97 costs an additional \$40. Everex backs the StepStation 2 with a three-year parts-and-labor warranty along with one-year of on-site service. —Angela Tuka

Prepared for Anything

Many of us have encountered unexpected problems when trying to stay connected on the road. Offering an emergency solution is 1-800-Batteries (800-228-8374, www.1800batteries.com), which has introduced the \$40 **Road Warrior Survival Kit**. The kit's contents will help you troubleshoot or circumvent most any situation, from extending a phone cord to testing a telephone outlet. The kit includes an eight-foot RJ-11 telephone cable, a dual modular phone jack adapter, a printer cable, a duplex coupler, a dual-outlet grounded surge protector, a 3-to-2 adapter, a telephone line tester, and a guidebook full of helpful tips to help the traveler use all these accessories. All of this equipment comes in a lightweight case, and it won't take up too much room in a suitcase. —AT

GRAPHICS SOFTWARE

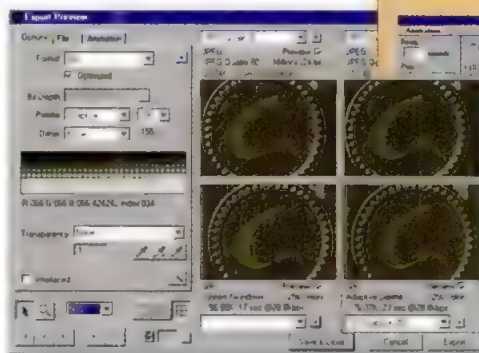
Web Design Tools

The growth of the Web has brought about the evolution of professional-level graphics tools for Web designers. Adobe Systems (800-833-6687, www.adobe.com) and Macromedia (800-470-7211, www.getfireworks.com) are offering two Web graphics packages that have a similar look and feel, offer comparable features, and let you interactively optimize graphics for viewing on the Web.

The strength of **Adobe ImageReady** (\$210 street) lies in its excellent set of animation tools. Put that together with the ability to design graphics from the ground up and you have a solid package for Web designers of any level. ImageReady can be used either as an add-on to Adobe Photoshop or as a standalone graphics tool that lets you create and edit images using many of the same tools offered in Photoshop (including masks, filters, and Magic Wand).

To create animation sequences, you display in-line

thumbnails of each frame, lay out GIF animations, and assign values, such as individual frame delays and looping. Each frame maintains individual layers, which means you can manipulate them even after the animation has been created. For instance, if you change the color of



use on the Web, ImageReady provides a tabbed view of the image so you can flip between the original and the optimized version. The optimized tab dis-

times, you can save it as Droplet, which then appears as an icon. You can drag and drop one or more images onto the Droplet to optimize the files without first having to launch ImageReady.

Macromedia's competitive solution for creating Web graphics is **Macromedia Fireworks** (\$300 street price). Like ImageReady, Fireworks combines all of the tools needed for designing Web graphics into a single, integrated package. There is a variety of cus-

WEB DESIGNERS EXTRAORDINAIRE: *Macromedia Fireworks (left) and Adobe ImageReady.*

tomizable brushes and standard tools for creating and editing images using standard graphics tools and a variety of customizable brushes. Fireworks also features image mapping, text effects such as drop shadows, and support for most Adobe plug-ins, including MetaCreations' Kai's Power Tools.

When creating animations, Fireworks generates individual frames that remain in layers. This means you can edit anything at any stage of the process. Excluding the background layer, which is static, the frames are independent of one another, so when you make a change to an object in one frame the change is isolated to that frame. A button generator can automatically create mouse-up, mouse-down, and mouse-over (or rollover) states.

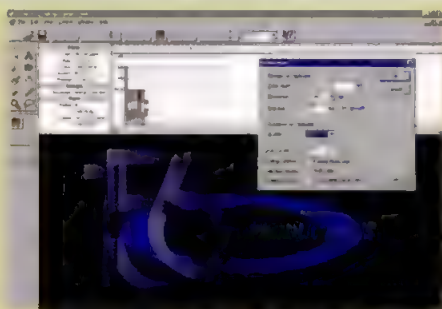
Fireworks' visual export tool lets you change the file format, color palette, and dither of your graphics. The window displays as many as four different versions of the image side by side, so you can compare the quality of each version while viewing file type, size, and estimated download time. As you make changes to the properties of an image, the preview updates, helping to ensure quick download speeds without losing image quality.

—Matthew Graven

Easier Animation

Vector-based images, which provide fast loading times and instant animation, are quickly becoming a major part of Web graphics. Macromedia (800-470-7211, www.flash.com) has long recognized the value of vector graphics for offering interactive multimedia online. With the latest update to Flash, Macromedia's vector graphics design tool, the vendor is determined to push the Internet to a new multimedia level.

Many of the new features in **Flash 3** (\$300 street)—including shape tweening, vector transparency, and bandwidth profiling—are intended to speed production as well as deliver better quality animation. Shape tweening, or morphing, offers designers the option of placing objects in various key frames. Tweening then automates the process of drawing all of the in-between frames, creating a seamless change between the objects. Sprite ani-

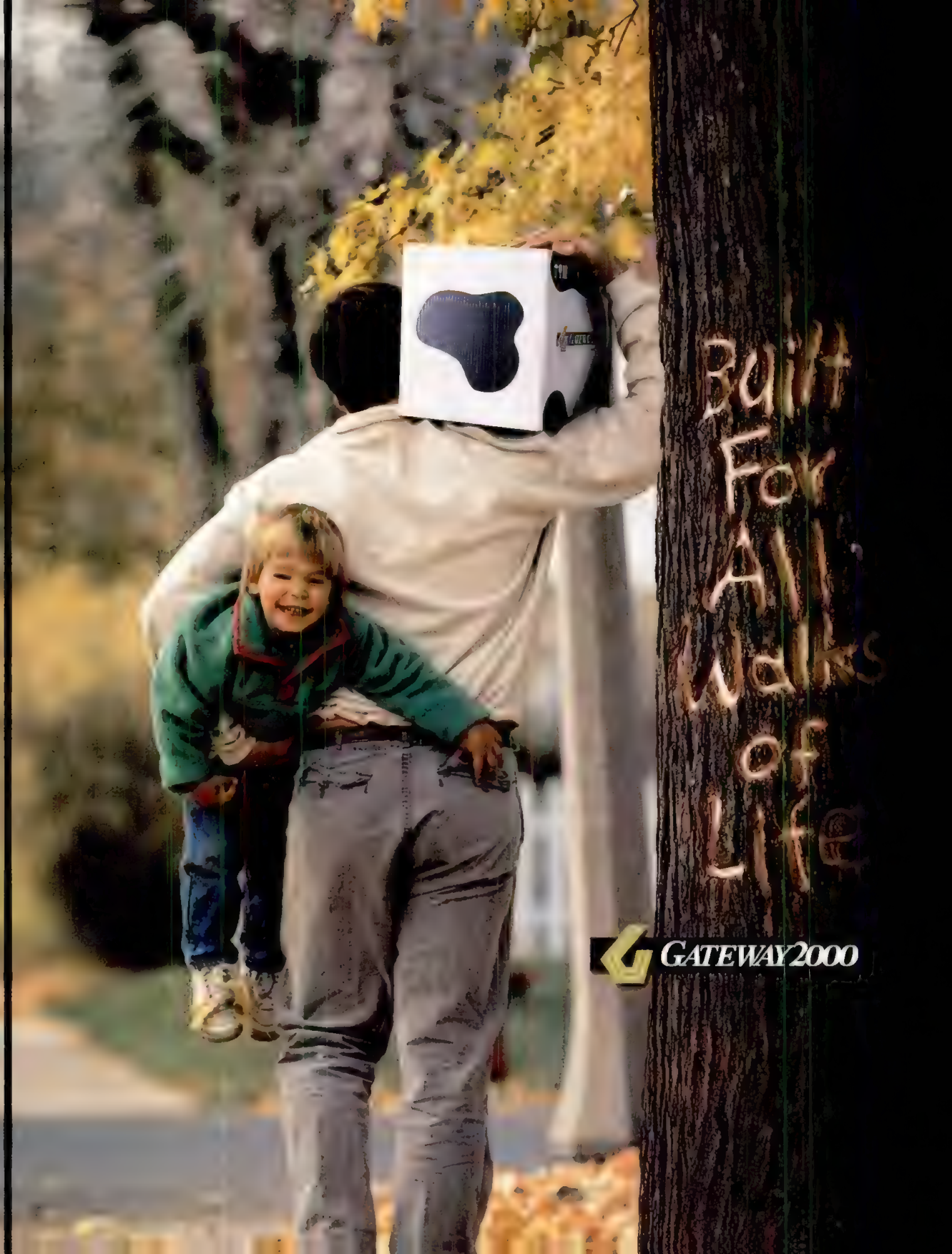


mation makes the creation of animated buttons and menus much simpler. There is now support for vector transparency, which enables such

design effects as gradients and color opacity.

The bandwidth profiler gives designers a graphical representation of an image's streaming performance, making it easy to spot frames that may cause a bottleneck. Flash's optimizing tools can be used to reduce the file size of these problem frames.

A big plus is the inclusion of standalone projectors that allow Flash files to be distributed with a Flash player as a single file. This eliminates the need for the person receiving the file to have the Flash player already installed. —MG



Built
For
All
Walks
of
Life

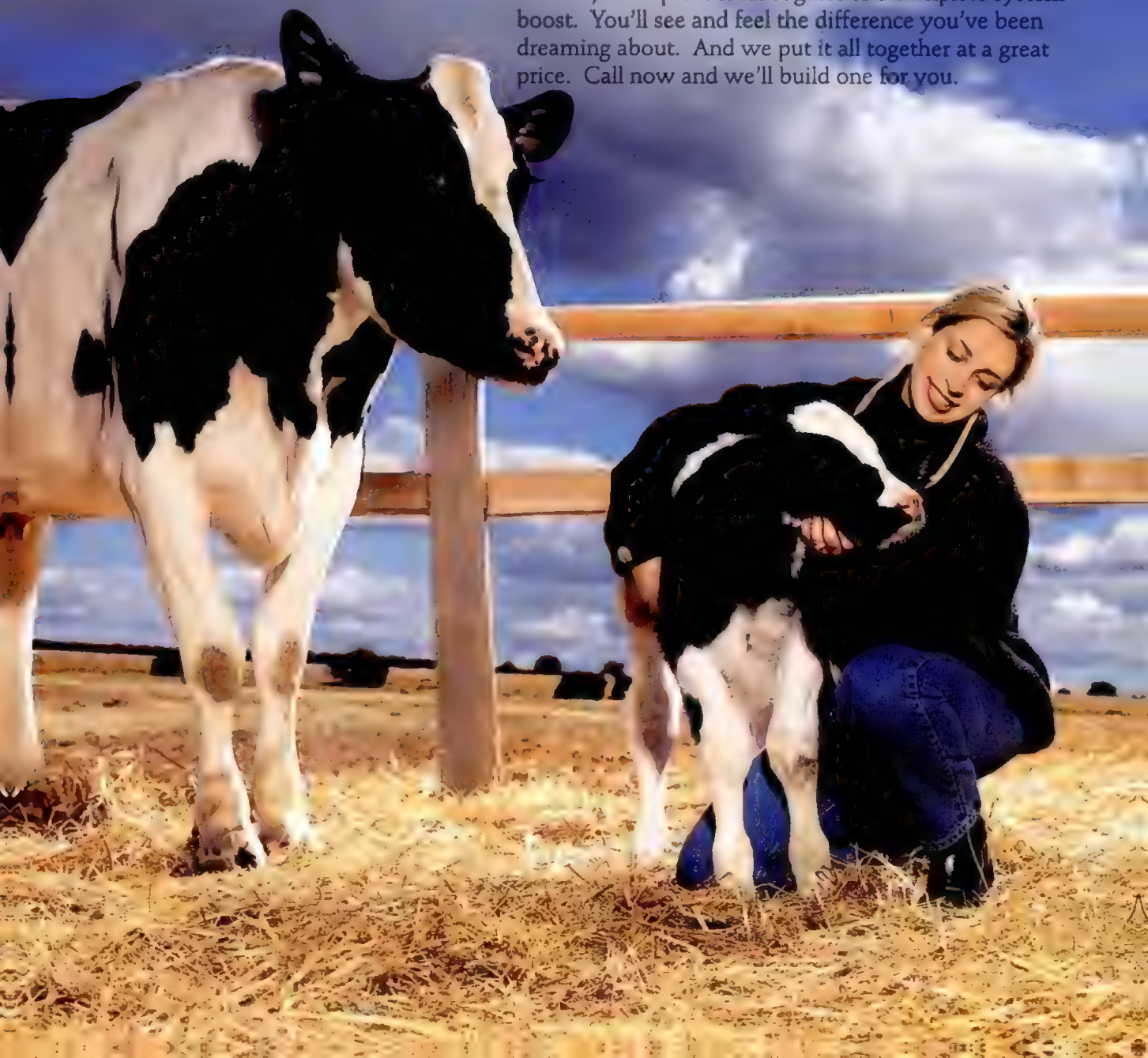
 GATEWAY2000

Fresh Technology

keeps her on
the front range.

Take your computing performance to a new level with a 350 or 400MHz Pentium® II processor and 100MHz bus. For years, the maximum speed of the bus (which transfers data around your PC) has been stuck at 66MHz — until now.

Intel's latest product advancement, the Intel 440BX AGPset, will open the floodgates to a complete system boost. You'll see and feel the difference you've been dreaming about. And we put it all together at a great price. Call now and we'll build one for you.



GATEWAY™ G-Series PCs with Pentium® II Processors



G6-400XL pictured with G-Series tower case.

G6-233

- Intel® 233MHz Pentium II Processor with 512K Cache
- 32MB SDRAM
- EV500 .28 Screen Pitch 15" Monitor (13.9" viewable)
- 4MB 3-D AGP Graphics
- 2GB 11ms Ultra ATA Hard Drive
- 13X min/32X max CD-ROM Drive
- 3.5" Diskette Drive
- Ensoniq® Wavetable Audio
- Altec Lansing® Speakers
- TelePath® Modem for Windows with x2™ Technology
- G-Series Desktop Case
- MultiFunction Keyboard & Microsoft® IntelliMouse™
- ▶ MS® Windows® 95 & MS Windows 98 Upgrade Offer
- Microsoft Home Essentials Software
- Gateway Gold™ Service & Support for G-Series PCs

\$1499 As low as* \$52/mo.

PC World Best Buy, March 1998

G6-300

- Intel 300MHz Pentium II Processor with 512K Cache
- 32MB SDRAM
- EV700 .28 Screen Pitch 17" Monitor (15.9" viewable)
- 4MB 3-D AGP Graphics
- 4GB 11ms Ultra ATA Hard Drive
- ▶ DVD-ROM Drive
- 3.5" Diskette Drive
- Ensoniq Wavetable Audio
- Boston Acoustics® MicroMedia™ 3-Piece Speaker System
- TelePath Modem for Windows with x2 Technology
- G-Series Mid-Tower Case
- MultiFunction Keyboard & MS IntelliMouse
- ▶ MS Windows 95 & MS Windows 98 Upgrade Offer
- Microsoft Home Essentials Software
- Gateway Gold Service & Support for G-Series PCs

\$1999 As low as* \$70/mo.

G6-350

- Intel 350MHz Pentium II Processor with 512K Cache
- 64MB SDRAM
- EV700 .28 Screen Pitch 17" Monitor (15.9" viewable)
- 4MB 3-D AGP Graphics
- 8.4GB 8.5ms Ultra ATA Hard Drive
- ▶ DVD-ROM Drive & DVD Decoder Card
- 3.5" Diskette Drive
- Ensoniq Wavetable Audio
- Boston Acoustics MicroMedia 3-Piece Speaker System
- TelePath Modem for Windows with x2 Technology
- G-Series Mid-Tower Case
- MultiFunction Keyboard & MS IntelliMouse
- ▶ MS Windows 95 & MS Windows 98 Upgrade Offer
- DVD Software Bundle
- Microsoft Home Essentials Software
- Gateway Gold Service & Support for G-Series PCs

\$2499 As low as* \$87/mo.

G6-400

- ▶ Intel 400MHz Pentium II Processor with 512K Cache
- 128MB SDRAM
- EV700 .28 Screen Pitch 17" Monitor (15.9" viewable)
- 4MB 3-D AGP Graphics
- 10GB 9.5ms Ultra ATA Hard Drive
- ▶ DVD-ROM Drive & DVD Decoder Card
- 3.5" Diskette Drive
- Ensoniq Wavetable Audio
- Boston Acoustics MicroMedia 3-Piece Speaker System
- TelePath Modem for Windows with x2 Technology
- G-Series Mid-Tower Case
- MultiFunction Keyboard & MS IntelliMouse
- ▶ MS Windows 95 & MS Windows 98 Upgrade Offer
- DVD Software Bundle
- Microsoft Choice Software
- Gateway Gold Service & Support for G-Series PCs

\$2999 As low as* \$103/mo.

G6-400XL

- ▶ Intel 400MHz Pentium II Processor with 512K Cache
- 128MB SDRAM
- EV900 .26 Screen Pitch 19" Monitor (18" viewable)
- 4MB 3-D AGP Graphics
- ▶ TV/FM Tuner Card
- ▶ 14.4GB 9.5ms Ultra ATA Hard Drive
- ▶ DVD-ROM Drive & DVD Decoder Card
- 3.5" Diskette Drive
- Ensoniq Wavetable Audio
- Boston Acoustics Media Theater™ 3-Piece Speaker System
- TelePath Modem for Windows with x2 Technology
- ▶ Iomega Internal ZIP Drive
- G-Series Tower Case
- MultiFunction Keyboard & MS IntelliMouse
- ▶ MS Windows 95 & MS Windows 98 Upgrade Offer
- DVD Software Bundle
- Microsoft Choice Software
- Gateway Gold Service & Support for G-Series PCs

\$3799 As low as* \$132/mo.

G6-333

- ▶ Intel 333MHz Pentium II Processor w/ 512K Cache, 4GB 11ms Ultra ATA Hard Drive, 32MB SDRAM, Microsoft Choice Software

\$2349 As low as* \$82/mo.



8 0 0 - 8 4 6 - 4 2 3 9

www.gateway.com

Buy a Gateway PC with Windows 95 and receive a Windows 98 upgrade offer. Call for details.

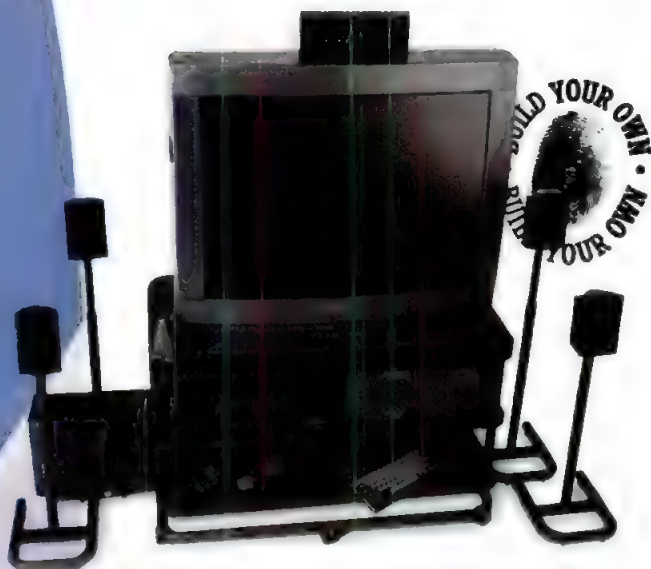
Life couldn't pass him by even if it tried.

Gateway always takes the fast track when it comes to cutting-edge technology — and the Destination® Digital Media Computer with DVD technology is no exception.

We turned the industry upside down by delivering all the multimedia marvels of a PC, surround sound stereo, high-fidelity speakers and more. But you'll really flip for the new infrared controller and media interface! One trip through the convenient on-screen setup, and your stereo and VCR functions are routed through the Field Mouse remote. And the easy-to-use media interface makes switching between devices a breeze. Call today or catch all the action at www.destination.com.



ter



Technical Specifications

Cordless Keyboard and Field Mouse Remote

Multidirectional, 4-Channel Radio Frequency

• 25' range • Control Buttons: Power, Volume, Channel, Mute and Recall • TV/PC Control • Keyboard Specifics: 4 AA Batteries (included), 87 Alpha-numeric keys and Microsoft Windows 95 key, EZ Pad touch pad, PS/2® Mouse Port • Remote Specifics: 4 AAA Batteries (included), Left and Right Mouse Buttons, Easy-Access Mouse Button on Back, Integrated Trackball, Numeric Keypad

31-inch SVGA Monitor*

Data Grade CRT: 33" Diagonal (31.5" viewable) • Invar Shadow Mask • Resolution: 640 x 480 @ 60-72Hz, 800 x 600 @ 60Hz • Unlimited Display Colors • Scanning Frequency: Horizontal, 31 to 38kHz; Vertical, 50Hz to 72Hz

36-inch SVGA Monitor*

Data Grade CRT: 38" Diagonal (35.5" viewable) • Invar Shadow Mask • Resolution: 800 x 600 @ 60Hz • Unlimited Display Colors • Scanning Frequency: Horizontal, 31 to 37kHz; Vertical, 59Hz to 75Hz • Autoswitching PC/TV Mode

Digital TV Capabilities

• Digital Line Doubling, Progressive Scan • Digital Comb Filter • Two-tap Vertical Line Interpolation • Five-tap Horizontal Line Interpolation • Brooktree 2164 Graphics Chip • 829a Video Decoder • 181-Channel, Cable-Ready TV/Tuner

harman/kardon® Home Theater Surround Sound System

AVR-10 Audio/Video Receiver w/ Remote • Frequency Response: 0.5Hz-100kHz @ 1W (+0/-3dB) • Signal-to-Noise Ratio: CD - 93dB; Video - 83dB • Four 3.5" Paper-Cone Satellite Speakers • Center Channel w/ 3.5 Paper-Cone Woofers (2) and .5" Polycarbonate-Dome Tweeter with Acoustic Lens in D'Appolito configuration & 50W 6.5" Paper-Cone Subwoofer

*Destination 31-inch and 36-inch monitors are covered by a one-year limited warranty. Write or call for a free copy.

Furniture sold separately. For more information on Euro Furniture, go to www.sanus.com.

GATEWAY™ Destination Digital Media Computers

All Destination systems include

- 2MB 2-D Graphics with Multiple Input Digital TV Tuner
- 3.5" Diskette Drive
- 7-Bay New-Look, Charcoal-Colored PC Case
- Cordless Keyboard w/ EZ Pad® Pointing Device
- Cordless Field Mouse® Remote
- **MS® Windows® 95 & MS Windows 98 Upgrade Offer**
- Microsoft® Home Essentials Software
- Gateway Gold™ Service & Support for DMCs

D6-233

- Intel® 233MHz **Pentium® II** Processor with 512K Cache
- 32MB SDRAM • 31" SVGA Monitor • 2GB 11ms Ultra ATA Hard Drive • Boston Acoustics® MicroMedia™ 3-Piece Speaker System
- **Infrared (IR) Controller & Media Interface** • Second Generation DVD-ROM Drive w/ DVD Media Bundle • 32-Voice Ensoniq® Wavetable Digital Sound • TelePath® Modem for Windows w/ x2™ Technology

\$2499 As low as* \$87/mo.

D6-266 BEST BUY

- Intel 266MHz **Pentium II** Processor with 512K Cache • 32MB SDRAM • 31" SVGA Monitor • 4MB Apocalypse™ 3Dx Graphics Accelerator • 4GB 11ms Ultra ATA Hard Drive • Boston Acoustics MicroMedia 3-Piece Speaker System • **Infrared (IR) Controller & Media Interface** • Second Generation DVD-ROM Drive w/ DVD Media Bundle • 32-Voice Ensoniq Wavetable Digital Sound • TelePath Modem for Windows w/ x2 Technology

\$2999 As low as* \$104/mo.

D6-300

- Intel 300MHz **Pentium II** Processor with 512K Cache
- 64MB SDRAM • 31" SVGA Monitor • 4MB Apocalypse 3Dx Graphics Accelerator • 8GB 8.5ms EIDE Hard Drive
- harman/kardon Dolby® ProLogic Sound System • **Infrared (IR) Controller & Media Interface** • Second Generation DVD-ROM Drive w/ DVD Media Bundle • 32-Voice Ensoniq Wavetable Digital Sound • TelePath Modem for Windows w/ x2 Technology

\$3999 As low as* \$139/mo.

D6-333XL

- Intel 333MHz **Pentium II** Processor with 512K Cache
- 128MB SDRAM • **36" (35.5" viewable) SVGA Monitor**
- 4MB Apocalypse 3Dx Graphics Accelerator • 10GB 8.5ms EIDE Hard Drive • harman/kardon Dolby ProLogic Sound System
- **Infrared (IR) Controller & Media Interface** • Second Generation DVD-ROM Drive w/ DVD Media Bundle • 32-Voice Ensoniq Wavetable Digital Sound • TelePath Modem for Windows w/ x2 Technology

\$4999 As low as* \$174/mo.



8 0 0 - 8 4 6 - 4 2 3 9

www.destination.com

Buy a Gateway PC with Windows 95 and receive a Windows 98 upgrade offer. Call for details.

We gave him the **power** of two.

Do your computer needs run a little beyond the pack? A Gateway Solo portable with Intel's muscular Pentium® II processor gives you desktop performance on the move. Choose a portable with the Pentium II processor and a 14.1-inch screen for just \$2,899. Gateway Solo portables lead the industry in price and performance — we'll customize one to fit your lifestyle. Call now.





Gateway Solo 2300

GATEWAY™ Solo™ Portable PCs

2300SE

- 12.1" SVGA DSTN Color Display
- Intel® 200MHz Pentium® Processor with MMX™ Technology
- 16MB SDRAM (expandable to 192MB)
- 2MB Graphics Accelerator w/ 64K Colors
- Modular 8X min/20X max CD-ROM Drive
- Modular 3.5" Diskette Drive
- 2GB Ultra ATA Hard Drive
- NiMH Battery & AC Pack
- USB Ports, CardBus & Zoomed Video Support
- NTSC/PAL Video Output
- Integrated 16-Bit Sound & Stereo Speakers
- EZ Pad® Pointing Device
- Casual Carrying Case
- ▶ **Microsoft® Windows® 95 & MS® Windows 98 Upgrade Offer**
- MS Works 4.5
- LapLink® for Windows 95
- McAfee® VirusScan
- Gateway Gold™ Service & Support for Portable PCs

\$1899 As low as* \$66/mo.

PC World Best Buy, January 1998

5100SE

- ▶ **14.1" XGA TFT Color Display**
- Intel 233MHz Pentium II Processor with 512K Cache
- 32MB SDRAM (expandable to 144MB)
- 2MB EDO Video RAM
- Modular 8X min/20X max CD-ROM Drive
- Modular 3.5" Diskette Drive
- 2GB Ultra ATA Hard Drive
- Lithium Ion Battery & AC Pack
- 2 USB Ports, CardBus & Zoomed Video Support
- NTSC/PAL Video Output
- Integrated 16-Bit Sound & Stereo Speakers
- ▶ **EZ Pad Plus Scrolling Pointing Device**
- Casual Carrying Case
- ▶ **MS Windows 95 & MS Windows 98 Upgrade Offer**
- MS Works 4.5
- LapLink for Windows 95
- McAfee VirusScan
- Gateway Gold Service and Support for Portable PCs

\$2899 As low as* \$101/mo.

5100XL

- ▶ **14.1" XGA TFT Color Display**
- Intel 266MHz Pentium II Processor with 512K Cache
- 64MB SDRAM (expandable to 144MB)
- 2MB EDO Video RAM
- Modular 8X min/20X max CD-ROM Drive
- Modular 3.5" Diskette Drive
- 4GB Ultra ATA Hard Drive
- Two Lithium Ion Batteries & AC Pack
- 2 USB Ports, CardBus & Zoomed Video Support
- NTSC/PAL Video Output
- Integrated 16-Bit Sound & Stereo Speakers
- PC Card Modem w/ x2™ Technology & cellular support
- ▶ **EZ Pad Plus Scrolling Pointing Device**
- Deluxe Leather Carrying Case
- ▶ **MS Windows 95 & MS Windows 98 Upgrade Offer**
- MS Office 97, Small Business Edition plus Bookshelf® 98
- LapLink for Windows 95
- McAfee VirusScan
- Gateway Gold Service and Support for Portable PCs

\$3899 As low as* \$135/mo.

9100SE

- ▶ **14.1" XGA TFT Color Display**
- Intel 233MHz Pentium II Processor with 512K Cache
- 32MB SDRAM (expandable to 192MB)
- 512K Pipelined Burst Cache
- 4MB EDO Video RAM
- ▶ **Removable Combo 8X min/20X max CD-ROM & 3.5" Diskette Drive**
- 4GB Ultra ATA Hard Drive
- Lithium Ion Battery & AC Pack
- USB Ports, CardBus & Zoomed Video Support
- NTSC/PAL Video Input & Output
- 16-Bit Wavetable Sound & Altec Lansing® Speakers
- PC Card Modem w/ x2 Technology & cellular support
- EZ Pad Pointing Device
- Casual Carrying Case
- ▶ **MS Windows 95 & MS Windows 98 Upgrade Offer**
- MS Works 4.5
- LapLink for Windows 95
- McAfee VirusScan
- Gateway Gold Service & Support for Portable PCs

\$3499 As low as* \$122/mo.

9100XL

- ▶ **14.1" XGA TFT Color Display**
- Intel 266MHz Pentium II Processor with 512K Cache
- 64MB SDRAM (expandable to 192MB)
- 512K Pipelined Burst Cache
- 4MB EDO Video RAM
- ▶ **Removable Combo DVD-ROM & 3.5" Diskette Drive**
- 5GB Ultra ATA Hard Drive
- Two Lithium Ion Batteries & AC Pack
- USB Ports, CardBus & Zoomed Video Support
- NTSC/PAL Video Input & Output
- 16-Bit Wavetable Sound & Altec Lansing Speakers
- PC Card Modem w/ x2 Technology & cellular support
- EZ Pad Pointing Device
- Deluxe Leather Carrying Case
- ▶ **Gateway Solo Mini Docking Station**
- ▶ **MS Windows 95, MS Windows 98 Upgrade Offer & MS Office 97, Small Business Edition plus Bookshelf 98**
- LapLink for Windows 95
- McAfee VirusScan
- Gateway Gold Service & Support for Portable PCs

\$4899 As low as* \$170/mo.

Solo 9100, PC Magazine Editors' Choice Award, January 1998



8 0 0 - 8 4 6 - 4 2 3 9

www.gateway.com

Buy a Gateway PC with Windows 95 and receive a Windows 98 upgrade offer. Call for details.

They've got car payments on the 5th, school loans on the 15th and a Gateway PC in the back seat.

Everyone knows GATEWAY PCs top the industry thanks to fresh technology and Intel® Pentium® II processors. Now hassle-free financing options make it even easier to ride off into the sunset with one of your very own! No wonder thousands of satisfied customers fall in love with Gateway every day.





All Gateway PCs are custom built to fit your needs with powerful Intel Pentium II processors. (System pictured with G-Series desktop case.)

Financing Options

- **Gateway Easy Pay** – Give your budget a boost with quick credit approval and loans up to \$25,000 with low fixed monthly payments. There's no application fee and repayment terms are flexible.
- **90 Days Same As Cash** – Looking at a power-packed system with Intel's latest 400MHz Pentium II processor, but you don't quite have the cash? Put your Gateway PC to work or play now, and don't pay a thing for 90 days. Ask for details.
- **Gateway Moola MasterCard® Credit Card** – For long term purchasing assistance, the Moola card offers a competitive interest rate and no annual fee, making it easy to own a value-packed Gateway PC. Plus you also earn rebate points that can be used toward future Gateway purchases. Certain restrictions apply.

Add-Ons (Available to existing Gateway customers or with system purchase.)

Printers & Scanners

(Each printer includes cable and ink cartridge.)

- Epson® Stylus® COLOR 400 Ink Jet Printer **\$179**
- Epson Stylus COLOR 600 Ink Jet Printer **\$249**
- Hewlett-Packard 722C Color Ink Jet Printer **\$299**
- Canon® BJC®-4300 Color Bubble Jet Printer **\$199**
- Epson Stylus COLOR 800 Ink Jet Printer **\$349**
- Hewlett-Packard LaserJet 6Lse Laser Printer **\$399**
- Hewlett-Packard 890Cse Color Ink Jet Printer **\$399**
- Hewlett-Packard OfficeJet 600 **\$499**
- Hewlett-Packard LaserJet 6Pse Laser Printer **\$799**
- Visioneer® PaperPort® Strobe Sheet-Fed Color Scanner **\$199**

Software

■ Learning 2000™ Lifetime Library

A curriculum-based education program that enhances kids' studies from fourth through twelfth grades.

Call for pricing.

- **Finance Pack** (For sale in U.S. only) Quicken® Deluxe 98; Quicken Financial Planner™ 2; Quicken Family Lawyer™ 7; Quicken Parents' Guide to Money™ **\$69**

- **Family Reference Bundle** Grolier Multimedia Encyclopedia®; Mindscape's® World Atlas 6.0; Rand McNally TripMaker™; National Geographic Really Wild Animals™ Swinging Safari Explore and Print & Mayo Clinic® Family Health. **\$79**

- **Gamer's Pack** Includes DeadLock™; Jack Nicklaus® 4; Super Bubsy®; Sega Rally™ Championship; Mixman 3-Mix™ & PC ProPad gaming device. **\$99**

- **Education Bundle Grades K-3** Reader Rabbit® 1; Math Rabbit®; Let's Start Learning!™; Interactive Math Journey®; Reader Rabbit's Interactive Reading Journey® 1; Paint, Write, Play!™ & Ultimate Children's Encyclopedia™ **\$99**

More Extras

- Kensington Master Lock® Cable **\$39**
- Microsoft® Precision Pro Joystick **\$59**
- Starter Kit **\$59** (Includes wrist rest, surge protector, CD wipes, monitor wipes, 10 formatted 3.5" diskettes, diskette/CD box and keyboard cover)
- Comfy™ ComfyKeyboard (for kids) **\$99**
- Microsoft SideWinder® Force Feedback Pro Joystick & Enthusiast Pack Software — Tigershark™: 2060 A.D.; MDK: Mission Laguna Beach™ & Interstate 76. (Contains adult language.) **\$139**
- Epson PhotoPC™ 550 Color Digital Camera **\$299**
- APC® Back-UPS Office™ **\$119**
- APC Back-UPS Pro 650 **\$319**

- **Education Bundle Grades 4-8** Super Solvers® Gizmos & Gadgets!®; Super Solvers OutNumbered!®; Student Writing Center®; Logic Quest™; The Oregon Trail® & Ultimate Writing & Creativity Center® **\$99**

- **Kid's Backpack™ 98** Barbie™ Magic Fairy Tales™ Barbie as Rapunzel; Highlights® Hidden Pictures™ Workshop; Wishbone™ and the Amazing Odyssey; Kids Count™ Jack's House™; Kids Count Jack's Attic™; CTW/Sesame Street® Elmo's Preschool; Twinsen's Odyssey™ & cow-spotted backpack. **\$99**



Toll Free from Canada 800-846-3609



Toll Free from Puerto Rico 800-846-3613



Toll Free from Mexico 001-888-888-0074



8 0 0 - 8 4 6 - 4 2 3 9

www.gateway.com

Buy a Gateway PC with Windows 95 and receive a Windows 98 upgrade offer. Call for details.

©1998 Gateway 2000, Inc. All rights reserved. Not all Gateway Solo PCs contain the Pentium II processor. The Intel Inside Logo, Intel and Pentium are registered trademarks, and MMX is a trademark of Intel Corporation. All other brands and product names are trademarks of their respective companies. All prices and configurations are subject to change without notice or obligation. Prices do not include shipping and handling and any applicable taxes. Many Gateway products are custom engineered to Gateway specifications, which may vary from the retail versions of the software and/or hardware in functionality, performance or compatibility. *Financing available on approved credit issued and administered by MBNA America® Bank, N.A. Payments based on 36-month term at an Annual Percentage Rate as low as 14.9%.

Trends Peripherals

DIGITAL CAMERAS

Better Photos, Less Money

With high-resolution (or "megapixel") digital cameras becoming more and more affordable, the timing may be right for you to make the switch to digital media for business and even personal use.

Eastman Kodak's entry in the

Tele/Wide, and Sequence Shooting. There's also a Macro mode that lets you move in tightly on small objects. Manual controls include +/- one-step exposure as well as a full-featured four-mode flash with red-eye reduction,



YOU OUGHT TO BE IN PICTURES: New high-resolution digital cameras from (clockwise from top left) Nikon, Olympus, Canon, Ricoh, and Kodak.

megapixel arena is the \$599 **Kodak Digital Science DC200** (800-242-2424, www.kodak.com). Weighing 11 ounces, the camera features a 39-mm fixed-focus lens and an 1,152-by-864-pixel image sensor, which provides good enough detail to produce photo-quality 5-by-7-inch prints. The DC200 includes an optical viewfinder and a 1.8-inch LCD, and it ships with a 4MB CompactFlash memory card. The "Finished File" feature processes images in the camera itself and then lets you drop them directly into photo-editing applications. NTSC and PAL video output is also supported.

Unveiling its latest digital camera is Olympus America (800-347-4027, www.olympus.com/digital). The **D-340L** (\$800 street) has a resolution of 1,280-by-960 and is built around a 5.5-mm all-glass f2.8 auto-focus lens. It boasts a variety of shooting modes, including 2X telephoto,

force-fill flash, and auto low-light and back-light modes. In addition to an optical viewfinder, the camera features a 2-inch built-in LCD. All images are processed by internal high-speed DRAM and then saved to a SmartMedia memory card (a 4MB card is included).

Nikon (800-526-4566, www.nikonusa.com) has added two megapixel models to its camera line: the **Coolpix 600** (\$600 street) and the **Coolpix 900** (\$900 street).

The Coolpix 600 has a resolution of 1,024-by-768, weighs 7.5 ounces, and includes an optical viewfinder, a 2-inch LCD, a detachable flash, and a 2X digital zoom. There are several user modes, including Slideshow, which can display images on your TV set. The Coolpix 600 ships with an 8MB CompactFlash card.

The Coolpix 900 ups the resolution to 1,280-by-960, which can generate 8-by-10-inch prints without loss of quality. It's the first digital camera furnished with a professional-quality Nikkor lens, and it features a 2-inch LCD and an optical viewfinder. User modes include digital telephoto and 3-foot macro in addition to +/- 2 EV exposure compensation. Special features include a 3X optical zoom and a 945-step auto-focus. There are also three auto-exposure metering modes plus a five-mode white balance. Images are stored on the included 4MB CompactFlash card.

This June, look for the new **Ricoh RDC-4300** (\$899), from Ricoh Corp. (800-225-1899, www.ricohcpg.com). A megapixel camera with native 1,280-by-960 resolution, the RDC-4300 has a 3X continuous zoom lens with 35- to 105-mm equivalency. The lens assembly rotates up to 180 degrees, so you can get just the right shot and still see the action on the 2-inch LCD

screen. Other features include auto-focus, variable flash settings, exposure compensation, and white balance. You can even record sound clips of up to 8 seconds in length with each image. Data is stored on the bundled 8MB SmartMedia card.

New from Hewlett-Packard (800-752-0900, www.hp.com) is the latest entry in its Photosmart family of digital peripherals: the \$699 **C20 Digital Cam-**

Smart Floppy Adapter

Moving photos from your digital camera to your PC can be a big hassle. Serial connections are slow and cumbersome, and memory-card adapters are meant for the PC Card slot on a laptop—that is, until now.

SmartDisk Corp. (941-643-1500, www.smartdisk.com), a joint-venture of Toshiba and Fischer International Systems, has released the **FlashPath** reader/writer for use with SmartMedia cards. Simply slide the SmartMedia card into the FlashPath and pop it into your floppy disk drive. You can read from and write to the card just as you would a standard floppy disk, which makes it a snap to shuttle pictures from your camera to your PC.—JMB

era. Built around a CCD offering 1,152-by-872 resolution, the camera includes an optical viewfinder and a built-in LCD screen. The ISO 100 exposure system features an electronic and mechanical shutter, and it includes auto-focus and a macro mode.

Coming this summer is the compact **PowerShot A5** (\$700 street), from Canon Computer Systems (800-658-2662, www.ccsi.canon.com). Weighing 8.5 ounces, this camera provides 1,024-by-768 resolution. The PowerShot contains an all-glass 5-mm f2.5 Canon lens and delivers TTL auto-focus with macro ability for images as close as 3.5 inches. In addition to an optical viewfinder, the camera features a 2-inch LCD on the back of the unit. It also includes automatic and manual exposure compensation and a 4-mode flash. An 8MB CompactFlash card comes standard.—Josh Levy

RECAP PC Magazine tested 29 digital cameras in our issue of February 10, 1998. Editors' Choices were awarded to products from Agfa, Canon, Kodak, Konica, and Olympus.

Faster Digital Film

Move over Kodak and Fuji—newcomer Lexar Media (510-413-1200, www.lexarmedia.com) wants to be known as the "digital film" company. Lexar has developed high-performance CompactFlash and SmartMedia memory cards that store photos up to twice as fast as conventional cards, which means less wait time between shutter clicks.

The **Digital Film Starter Kit** begins at \$79.99 and includes a memory card, the popular manual *Teach Yourself Digital Photography in 14 Days*, a comprehensive software bundle, and more. You can also buy the memory cards separately (prices start at \$49.99).—Jamie M. Bsaies



TINY YET SPEEDY: One of Lexar's high-capacity, high-throughput memory cards.

WEB AUTHORIZING TOOLS

Set Your Sites High

Although HTML programming continues to get more complex, new tools are making it easier than ever to create professional-looking sites. Here are three of the latest Web authoring tools that help beginners get their sites up and running with ease.

Luckman Interactive's \$150 **Web Studio 2.0** is a site development toolkit that incorporates HTML, Java, database, and report-generation capabilities (800-711-2676, www.luckman.com). Web Studio 2.0 features Luckman's WebEdit Pro 3.0, an HTML editor with real-time syntax checking and an integrat-

ed WYSIWYG preview window that displays your site as it would appear in a Web browser. The package also includes Penumbra's Mojo for drag-and-drop Java applet creation, Platinum Technology's VRCreator application for VRML content, and Seagate Software's Crystal Reports database access and report-generating program.

From MicroVision Development Inc. (800-998-4555, www.mvd.com) comes **WebExpress 3.0**. This \$70 site authoring tool offers several new management features, including continuous visibility of the Web Site Manager, which lets users view their entire sites while editing specific Web pages. Four design wizards walk you through setting up and launching your site and creating

pages with frames and forms, while a multimedia wizard helps you add sound files, video clips, and plug-ins. WebExpress 3.0 is available for Windows 3.x, 95, and NT environments.

If you're new to desktop publishing, then Beam International Ltd.'s **Splash!** may be right for you (www.gosplash.com). This \$49.95 package features a drag-and-drop WYSIWYG environment for creating Web pages that automatically incorporate Java and customized Java applets. Management features include a map facility, which helps you visualize site structure, and page and site statistics, which show you the size of HTML pages along with the images on a particular page. You can also check

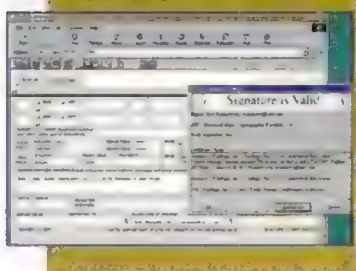


TODDLING YOUR SITE: Beginners can use these authoring tools on their sites.

Form Factor

InternetForms is a software suite that allows organizations to distribute, process, and store forms digitally, reducing paper usage and ensuring accurate records of electronic documents. The beta release of UWI.Com's (www.uwi.com, 888-517-2012) product also incorporates Microsoft's CryptoAPI for digital signatures.

With its new digital signature capability, InternetForms is designed to improve security and the reliability of Web-based transactions and e-commerce. Unlike HTML forms, which record only the user's answers and not the original questions, InternetForms stores the entire form as an object. Forms are complete with digital signatures, so data cannot be taken out of the context in which it was originally signed.—EC



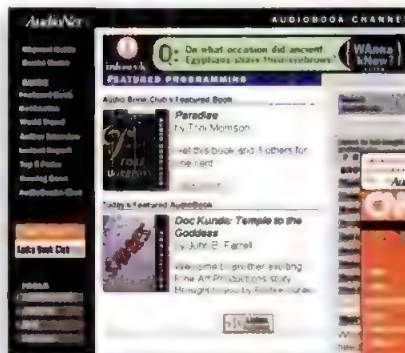
INTERNET STREAMING AUDIO

Time to Listen Up

It's ironic that one of the oldest mass communications mediums, radio, has proven to be such a natural fit with the world's newest, the Internet. The variety and quantity of programming options that are available to online listeners continue to grow.

CNN Interactive and AudioNet have inked a deal to broadcast CNN's new online service, **CNN AudioSelect**. Both CNN (www.CNN.com) and AudioSelect (www.audionet.com/cnn/audioselect) will cover news, sports, celebrities, and health issues. Under the agreement, AudioNet will broadcast live audio feeds of CNN/U.S., CNN Headline News, CNN International, CNN/SI, and updated reports from CNNRadio.

Another new service from AudioNet is **AudioBooks** (www.audionet.com/books), which offers live, on-demand program-



NOW HEAR THIS: Books, music, and news are all available via the Internet.

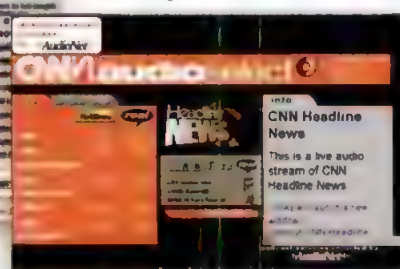
ming for book readers. With AudioBooks, you can browse and listen to over 500 full-length audio books at no cost, listen to live interviews with best-selling authors, participate in AudioNet's chat sessions with other

out your pages at different screen resolutions, and with the help of an in-built FTP utility you can automatically upload a whole site to the host without inadvertently losing pages. —Emily Cohen

audio book enthusiasts, or join the Audio Book Club to purchase audio books online.

Imagine Media has recently launched **Imagine Radio** (www.imagineradio.com), a network of original radio stations that broadcast only on the Internet. Imagine Radio's advertisement-supported programming includes 24-hour news, talk shows, and music.

In order to access Imagine Radio, you must download the



"tuner," which is a front end to RealAudio. The tuner includes personalization options that allow you to read artist and song information and customize song rotation within any of the music stations.—Doug Beizer

The blueprint for the

Built to increase productivity.

The Intel Architecture delivers the performance and reliability needed to keep your business running at top speed.

Developed for maximum headroom.

The Intel Architecture protects your IT investment by combining your immediate performance needs with headroom for tomorrow's evolving environment.



way you do business.

Designed for flexibility.

The Intel Architecture is designed for flexibility, scalability, and capability without the high total cost of ownership models to meet your specific business needs.



As you build and maintain your company's computing environment, it's important to have a strong foundation. That's why the Intel Architecture should be a part of your plan.

The Intel Architecture offers the performance you need across all platforms. From desktops to data centers, it delivers reliable, scalable solutions based on proven technology. The same

technology found in the Pentium® II processor, Intel's most powerful processor ever. Plus, you get solutions that not

only work today, but also provide the headroom you need for the future.

For the whole story, visit our Web site and learn how you can build a stronger foundation for your company. www.intel.com/businesscomputing

intel®

The Computer Inside.™

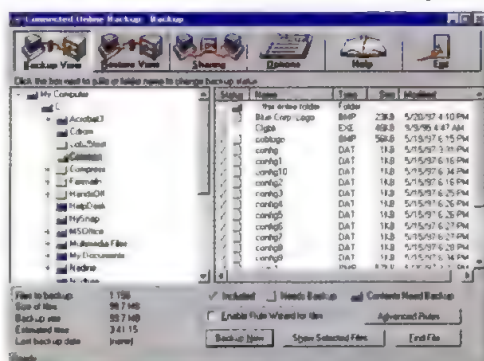


ONLINE BACKUP

Your Connection to Backups

Until recently, the ability to back up corporate data to an off-site location via the Internet was available from only a handful of third-party service providers with their own storage facilities. But Connected Corp. (800-353-3078, www.connected.com) and Telebackup Systems (403-283-3995, www.telebackup.com) have stepped in with online backup products that let you send data across the Internet to your own storage facilities.

Connected Online Backup (COB) 3.0, from Connected Corp., is composed of four components: the \$20,000 COB/Secure central backup engine; the COB/Protect client agent, which sells for \$189



ANYWHERE, ANYTIME: COB lets you back up your local and remote systems over an IP Network.

per client; and the COB/Deploy deployment module and COB/Control management console, both of which are included free with the central backup engine.

With COB, connected users can back up their systems at any

time. Before COB transmits across the wire, it compresses data to economize bandwidth as well as disk and tape space. If your network or Internet connection goes down during a backup, the next backup transmission begins where the previous one left off.

Employing COB does not mean sacrificing security. The product works in conjunction with most firewalls and uses triple DES encryption before transmitting data. Further protection is provided by COB's use of certificate-based access control to the administrative console.

Taking a slightly different approach to data storage is Telebackup System's **TSInfoPro Enterprise Backup**, which provides disk-to-disk storage that eliminates the need for tapes and tape

archives. Starting at \$20,000 (plus \$7,500 per 100-client pack), the product uses an incremental backup scheme that initially backs up the complete file and then saves only the changes to existing files (hence the conservation in bandwidth).

Based on a client/server model, TSInfoPro runs as an application on the target system PC. The client controls the initiation of the backup process and handles the bulk of the processing. Systems can connect to the dedicated backup server via a network, Internet, intranet, or dial-up connection so that mobile and remote users get the same backup security as network users.

With TSInfoPro in play, if a PC fails, you can restore the operating system, applications, and data either remotely or locally by using an emergency recovery boot floppy disk and a CD-ROM copy of all systems content.—Robert Daly

REMOTE-ACCESS SERVERS

New Servers on the Block

Connecting remote users to remote sites is no longer a job only for large corporations with nationwide sales forces. Small and medium-size businesses are finding that remote connectivity is increasingly becoming a necessity. The same goes for companies that need to keep in touch with branch offices or companies with handfuls of telecommuters.

3Com Corp. (800-638-3266, www.3com.com) has announced the **SuperStack II Remote Access System 1500**, the successor to the vendor's AccessBuilder and Total Control NetServer line of remote-access servers. The base chassis of this stackable solution (which starts at \$2,995) comes with two ports for I/O cards that can each accommodate a four-port V. Everything/V.34 analog modem unit or a two-port ISDN-BRI modem unit.

The product also features the optional \$1,595 Expansion Unit

1500, which adds two cards per unit. You can include a maximum of two Expansion Units per base unit for 24 analog ports, 12 digital ports, or a mix of both.

The SuperStack II offers a high level of security with support for PAP, CHAP, RADIUS, and Windows NT or NetWare server authentication. It also comes with a wizard-based GUI for installation and HTML-based documentation. You can manage the unit using either a terminal connected to the unit's console port or 3Com's Windows-based Transcend Remote Access Manager.

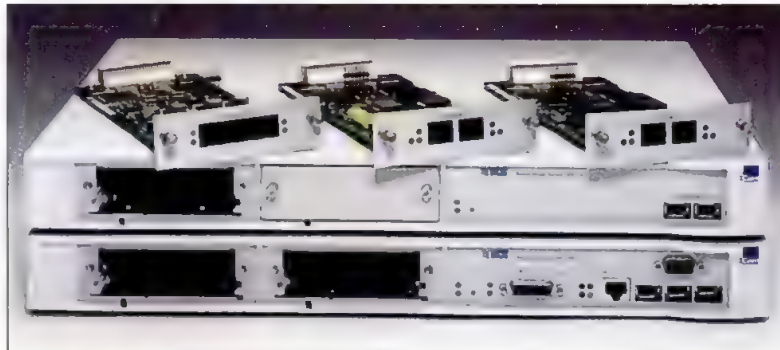
Although not a new face in the networking market, Compaq Computer Corp. (800-345-1518, www.compaq.com) has also burst onto the remote-access scene with three Windows NT remote-access

servers based on the company's existing server lines.

Starting at the entry level is the \$5,939 **Compaq Remote Access Server 5208**, which is based on the Compaq ProSigna 200 and comes with an eight-port analog modem. The mid-level \$12,539 **Compaq Remote Access Server**

an interface for a single T1/E1 or ISDN PRI connection. It can also support an additional three T1 or PRI lines.

Each server comes with Windows NT Server 4.0 preinstalled along with a suite of administrative and reporting software. By using Windows NT's built-in



SCALING TO NEW HEIGHTS: 3Com's new SuperStack II Remote Access System 1500 lets you add analog and digital ports as needed.

5408, also based on the ProSigna 200, offers an eight-port ISDN BRI interface that permits 16 digital connections. The high-end \$15,069 **Compaq Remote Access Server 5601** is based on the Compaq ProLiant 1600 and provides

remote-access software, IS managers will not have to invest time or resources in training and can continue to use existing Windows NT-based management applications to control the Compaq Remote Access Server.—RD

STATISTICA

STATISTICA (automatically configures itself for Windows 95, NT, or 3.1) ■ A complete data analysis system with thousands of on-screen customizable, presentation-quality graphs fully integrated with all procedures ■ Comprehensive Windows support, OLE (client and server), DDE, customizable *AutoTask* toolbars, pop-up menus ■ Multiple data-, results-, and graph-windows with *data-graph* links ■ The largest selection of statistics and graphs in a single system; comprehensive implementations of: Exploratory techniques with advanced brushing, multi-way tables with banners (presentation-quality reports); nonparametrics, distribution fitting, multiple regression; general nonlinear estimation; stepwise logit/probit; general ANCOVA/MANOVA; variance components; stepwise discriminant analysis; log-linear analysis, confirmatory/exploratory factor analysis; cluster analysis; multidimensional scaling; canonical correlation; item analysis/reliability; correspondence analysis; survival analysis; a large selection of time series modeling/forecasting techniques; structural equation modeling with *Monte Carlo* simulations; and much more ■ On-line *Electronic Manual* with comprehensive introductions to each procedure and examples ■ Hypertext-based *Stats Advisor* expert system ■ Workbooks with multiple *AutoOpen* documents (e.g., graphs, reports) ■ Extensive data management facilities (fast spreadsheet of unlimited capacity with long formulas, *Drag-and-Drop*, *AutoFill*, *Auto-Recalculate*, split-screen/variable-speed scrolling, advanced Clipboard support, DDE links, hot links to graphs, relational merge, data verification/cleaning) ■ Powerful *STATISTICA BASIC* language (professional development environment) with matrix operations, full graphics support, and interface to external programs (*DLLs*) ■ Batch command language and editable macros, flexible "turn-key" and automation options, custom-designed procedures can be added to floating *Auto Task* toolbars ■ All output displayed in *Scrollsheets* (dynamic, customizable, presentation-quality tables with instant 2D, 3D, and multiple graphs) or word processor-style report editor (of unlimited capacity) that combines text and graphs ■ Extremely large analysis designs (e.g., correlation matrices up to 32,000x32,000, virtually unlimited ANOVA designs) ■ Megabyte Manager with up to 32,000 variables (8 Mb) per record ■ Unlimited size of files; extended ("quadruple") precision, unmatched speed ■ Exchanges data and graphs with other applications via DDE, OLE, or an extensive selection of file import/export facilities (incl. *ODBC* access to virtually all data bases and mainframe files) ■ Hundreds of types of graphs, incl. categorized multiple 2D and 3D graphs, ternary 2D/3D graphs, matrix plots, icons, and unique multivariate (e.g. 4D) graphs ■ Facilities to custom-design new graph types and add them permanently to menus or toolbars ■ On-screen graph customization with advanced drawing tools (e.g. scrolling and editing of complex objects in 32x real zoom mode), compound (nested) OLE documents, *Multiple-Graph AutoLayout Wizard*, templates, special effects, icons, page layout control for slides and printouts; unmatched speed of graph redraw ■ Interactive rotation perspective and cross-sections of 3D displays ■ Large selection of tools for graphical exploration of data: extensive brushing tools with animation, fitting, smoothing, overlaying, spectral planes, projections, layered compressions, marked subsets ■ Price \$995.

Quick STATISTICA (for Windows) ■ A subset of *STATISTICA*, comprehensive selection of basic statistics and the full analytic and presentation-quality graphics capabilities of *STATISTICA* ■ Price \$495.

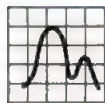
STATISTICA Industrial System (requires *STATISTICA* or *Quick STATISTICA*) ■ The largest selection of industrial statistics in a single package; quality control charts (real-time data acquisition options), process capability analysis, R&R, sampling plans, and an extremely comprehensive selection of experimental design (DOE) methods ■ Flexible tools to customize and automate all analyses and reports (incl. "turn-key" system options, and tools to add custom procedures) ■ Price \$995.

NEW STATISTICA Neural Networks (interfaces with, but does not require *STATISTICA*) ■ The most comprehensive NN application available on the market, unique automatic (AI) network generators ■ Price \$795.

STATISTICA/Mac (for Macintosh) ■ Price \$695 (Quick - \$395).

Overseas prices vary. Domestic sh/h \$12; 30-day money back guarantee

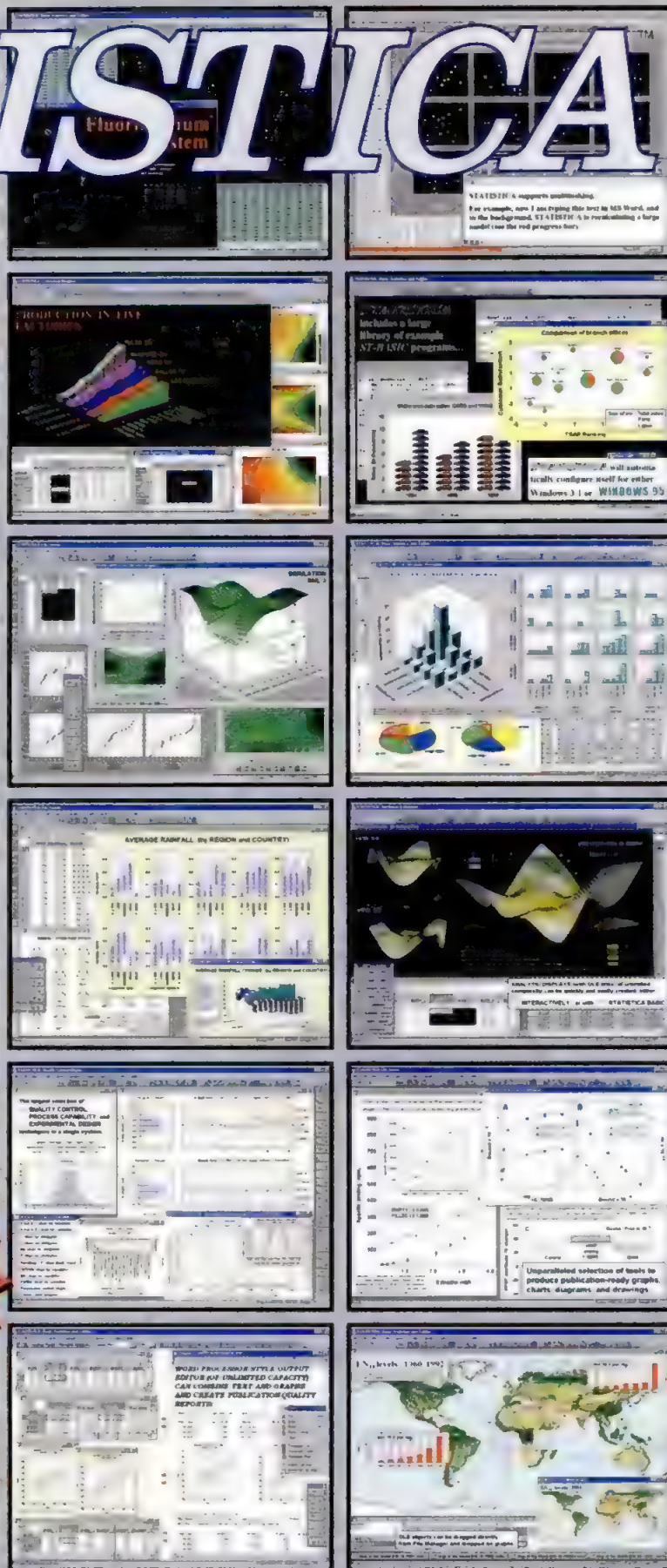
STATISTICA has received the highest rating in EVERY comparative review of statistics software in which it was featured, since its first release.



StatSoft

2300 East 14th Street • Tulsa, OK 74104 • (918) 749-1119
Fax: (918) 749-2217 • WEB: <http://www.statsoft.com>
e-mail: info@statsoft.com

- StatSoft Ltd. (London, UK), ph: +44 1234 341226, fax: +44 1234 341822
- StatSoft GmbH (Hamburg, Germany), ph: +49 40/468866-0, fax: +49 40/468866-77
- StatSoft France (Paris, France), ph: +33 01-45-185-999, fax: +33 01-45-185-285
- StatSoft Polska Sp. z o.o. (Krakow, Poland), ph: +48 12-381120, fax: +48 12-381121
- StatSoft Italia (Padova, Italy), ph: +39 49-893-4654, fax: +39 49-893-2897
- StatSoft Pacific Pty Ltd. (Australia), ph: +613 9521 4833, fax: +613 9521 4288
- StatSoft Japan (Tokyo, Japan), ph: +813 3867 1110, fax: +813 3668 3100
- StatSoft Taiwan (Taipei, Taiwan, R.O.C.), ph: +886 2 5780587, fax: +886 2 5783179



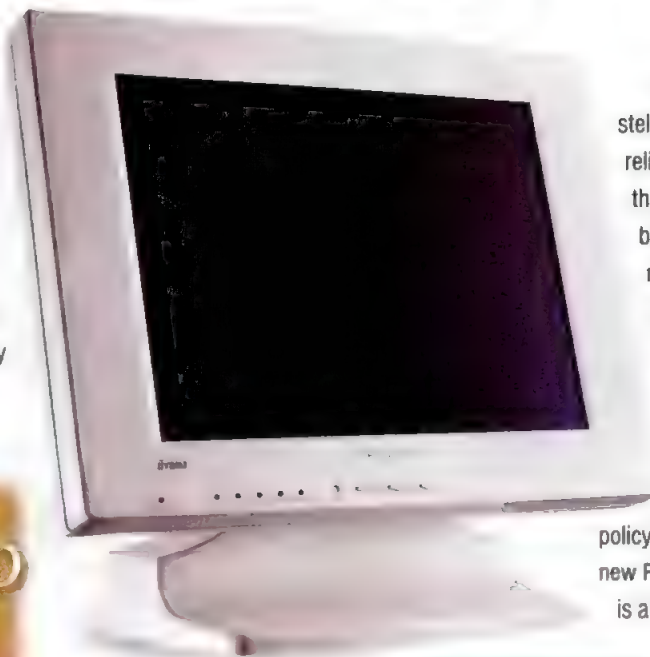
The complete line of StatSoft products and training/consulting services are available from authorized representatives worldwide including Austria, Belgium, Brazil, Chile, Czech Republic, Denmark, Finland, Greece, Hungary, India, Korea, Malaysia, Mexico, The Netherlands, New Zealand, Norway, Portugal, Russia, South Africa, Spain, Sweden, Switzerland, Turkey. Please contact your nearest StatSoft office for the authorized representative nearest you. StatSoft, the StatSoft logo, STATISTICA, and Scrollsheet are trademarks of StatSoft, Inc.

Choose 057 at www.pcmag.com/infolink

\$1299*

Getting the highest quality TFT LCD monitor at an affordable price just became possible.

We've listened to our customers to combine the features you want at an unthinkable price. Our 14.1" active matrix TFT display produces brilliant, rock-steady



So what is more important: stellar performance, outstanding reliability, exceptional value, the latest technology, or the best warranty in the business? With Iiyama's new ProLite 36 LCD, you make no tradeoffs.

Unbeatable price.
Award-winning quality.
Our exclusive No Worries™ 3-year limited warranty policy**—it's easy to see why the new ProLite 36 from IiyamaDirect is a true champion.

TFT 14.1" LCD



1024 x 768 resolution

1024 x 768 images at 75Hz. The sleek ProLite 36 panel is only 2.5" wide and its base conveniently includes a built-in power supply.

	Pro Lite 36 Specifications
LCD Panel	35cm (14.1" Viewable) TFT Color Liquid Crystal Display; Rat panel Pixel Pitch: 0.27mm x V response time: 80ms nominal
Display Colors	Full Panel
Sync Frequency	Horizontal: 23.0 - 62.5 kHz, Vertical: 50 - 200 Hz
Maximum Resolution	1024 x 768
Dot Clock	79MHz maximum
Power Consumption	27 W maximum Power Management: 6W (max)
Dimensions/Net Weight	15.4 x 14.2 x 7.8" (W x H x D) / 2.3 lbs.
Tilt-Swivel Angle	Upward 30 degrees
Approvals	CE, TUV-GS, MPRI, ISO 9241-3 / ISO 9241-8, FCC-B, TCO 95, UL/CUL, VCCI-B
Warranty	3-year limited warranty—LCD/Parts/Labor 1 year backlight; Vision Care, 48-hour exchange available



Iiyama DIRECT

(888) 663-2289

www.iyamadirect.com



January 6, 1998
Vision Master Pro 17



Perfect Five-Star Rating
January 1998
Vision Master 450
Vision Master Pro 500



Perfect Five-Star Rating
November 1997
Vision Master Pro 17



Performance & Technical Excellence
March 1997
Vision Master Pro 21



Six Time Winner
Jan 1997, Feb 1997, March 1997,
April 1997, May 1997, June 1997
Vision Master Pro 21



October 7, 1997
Vision Master Pro 17



March 1997
Vision Master Pro 21



Six Time Winner
July 1996, Jan 1997, March 1997,
July 1997, Sept 1997, Jan 1998
Vision Master Pro 17

* Actual price as of 03/23/98. Please call (888) 663-2289 or visit www.iyamadirect.com for current pricing.

© 1998 Iiyama North America, Inc. All rights reserved. Iiyama, IiyamaDirect, the IiyamaDirect logo, No Worries, and the RSVP logo are trademarks of Iiyama North America, Inc. All other trademarks are the properties of their respective owners.
**Three year parts and labor, 1 year backlight. Comparative prices and specifications are based on information provided by the manufacturers as of 12/31/97. Manufacturer's Estimated Price is shown, actual price may vary.
Prices do not include shipping, handling, and any applicable taxes. Specifications are subject to change without notice. Offer valid only in the United States of America. As an Energy Star™ Partner, Iiyama has determined that this product meets the Energy Star™ Guidelines for energy efficiency. For more information, please write us at 575 Anton Blvd., Suite 590, Costa Mesa, CA 92626. 888/663-2289, 714/437-5111; Fax: 714/437-5982; Home Page: www.iyamadirect.com

Choose 184 at www.pcmag.com/infolink

First Looks



INSIDE

LILLIPUTIAN:

Toshiba's third-generation Libretto is the same small size, but its processor is faster and its hard disk is bigger. See page 56.



XTRA SPECIAL EFFECTS:



Macro-media releases Version 8 of its award-winning illustration

package, FreeHand. For the review, see page 68.

WEAR YOUR PC:

The Xybernaught 133P redefines "mobile computing." To read how science fiction becomes reality, see page 76.



More Products Reviewed...

Philips Velo 500	56
Microsoft BackOffice	
Server 4.0	60
HP Network ScanJet 5	64
DVRex-M1	64
Conversá Web	73
SurveySolutions for the Web	73

First Looks Online

For daily just-in-time reviews of shipping products, check out First Looks Online at www.firstlooks.com



Personal Recording Studios

Use a CD-R drive with one of these four audio publishing packages to create your own customized audio CD compilations.

By Jan Ozer

Imagine yourself as a record industry executive serving an audience of one. You have it in your power to compile your favorite tracks from your favorite audio CDs into your very own greatest-hits CD-ROM. You can even add cool CD labels and awesome liner graphics to complement the music CD you've created.

That's the idea behind several new CD-R software programs that are particularly suited for publishing audio CDs. The only downside is that unless you're recording original music, your masterpieces will have to remain for your personal consumption only. If you get caught attempting to sell your compilation, you'll almost definitely get sued by the

Recording Industry Association of America (RIAA).

Even though the first CD-R programs that came to market let you compile audio tracks into a CD-ROM, they were so convoluted and inaccessible that you had to wear a propeller in your cap in order to use them. Capitalizing on current market trends—which include sub-\$400 CD-R drives and CD-R media costing less than \$2—several vendors have designed programs specifically for audio compilations, and the software is now well within the reach of almost all computer users.

THE SETUP

Before you do anything else, you'll obviously need to install a CD-R drive. If you plan to record from a cassette or record

player, you'll need audio-out capabilities to connect to your sound card. We used the headphone jack on our cassette player for audio out.

To record from your current CDs, you'll need a source CD-ROM drive that has digital audio-extraction capabilities; this is a common feature among newer (but not older) drives. If your CD-R drive doubles as your CD reader, it can serve as both source and destination disk, but you'll need plenty of disk space in order to do so (count on having at least 700MB available).

In this roundup, we looked at four audio CD-ROM publishing packages: Adaptec's Easy CD Creator Deluxe (\$99 list), Ce-Quadrat's just!audio (\$79 list), Creative Digital Research's

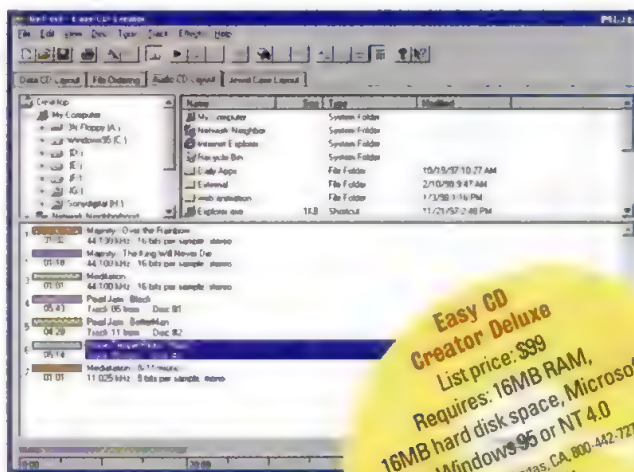
First Looks

HyCD Music (\$59 list), and Elektrosn's GEAR Audio (\$99 list; \$69 download). All can compile audio tracks from multiple CDs and label tracks by title and artist. All except HyCD offer noise-removal functions to eliminate the snaps, pops, and cracks from your vinyl records, and several have CD label and jewel case art designers.

Our testing of these programs involved creating a compilation CD with one scratchy WAV file, tracks from two different audio cassettes, and one track each from three audio CDs. We ran all tests at 2X writing speed on a 200-MHz Pentium MMX system, and we tested both the software's noise filtering and print functions whenever available. After successfully writing the CD-ROM, we tested the disk in four separate players—two consumer audio CD players and two CD-ROM drives.

THE FINE PRINT

Of course, this discussion begs the question of whether con-



MIX AND MATCH: Easy CD Creator offers an easy-to-use interface for compiling tracks of mixed origin.

sumers can legally copy audio CDs for their own use. Unfortunately, confusion reigns supreme on this matter, since the CD-R hardware and software industry says yes, the RIAA says no, and no direct case law exists.

Nevertheless, it appears that rather than pursuing consumers, the record industry is attempt-

ing to convince CD-R software and drive manufacturers to prevent recording in future product versions. The only certainty is that if you sell CD-compilations you've made yourself, you're committing actionable copyright infringement.

Adaptec Inc.

Easy CD Creator Deluxe

Adaptec's Easy CD Creator Deluxe (\$99 list) is the class act of the general CD-R field, and its audio recording capabilities are extensive and well-crafted. Though not as integrated or engaging as just!audio, CD Creator offers tools that are deeper, more sophisticated, and probably better suited for those audiophiles who want tweak-level access to their recordings.

Adaptec ships Easy CD-Creator Pro with CD Spin Doctor for audio processing and several other programs, including a simple audio editor. A twelve-label starter kit and audio cable rounds out the bundle.

You'll use Spin Doctor to record and process audio from analog sources like cassette or record players; there is a volume meter to assist you, but no volume controls. The program's easy-to-use interface offers advanced features like audio filter-

Easy CD Creator Deluxe
List price: \$99
Requires: 16MB RAM,
16MB hard disk space, Microsoft
Windows 95 or NT 4.0
Adaptec Inc., Milpitas, CA, 800-442-7274,
408-957-7274
www.adaptec.com
Choose 409 at
www.pcmag.com/infoink

Make Your Own CD Online

Music lovers with CD-R drives now have one less reason to leave home. Courtesy of technology from Liquid Audio, you can now purchase audio tracks on the Internet and burn them onto your own custom CD-ROM. If you're using a 28.8-Kbps modem, however, you'll need to be patient.

Start by downloading the Liquid MusicPlayer CD from www.liquidaudio.com. Then check out the list of Liquid Audio enabled sites and start grazing.

You can play a streaming sample of any song at bandwidths customized for your Internet connection speed. You can also view a bitmap of the album cover, liner notes, song lyrics, and production credits. The per-track cost varies by Web site and song, with most costing around \$1.00 or less (charged to a credit card).

With your first purchase, you can obtain a Liquid Audio Music Passport, which is used in the security system defined below. Then the download begins.

If you've got a 28.8-Kbps modem, patience should be your watchword. Though Liquid Audio shrinks the track with Dolby

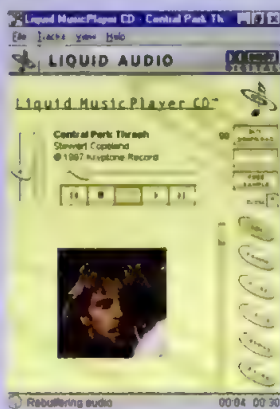
Digital compression, the average five-minute song is about 8MB in size and downloads in around 40 minutes.

Once safely on disk, the songs can be played only with the Liquid MusicPlayer. For security, the downloaded file is keyed to your specific Music Passport and won't play on other computers equipped with MusicPlayer.

Similarly, even though you can use MusicPlayer to burn the tracks to CD-ROM, once again it checks the Passport for authenticity and will burn only one copy of each downloaded track. And even though you can use traditional CD-R software to copy the audio tracks once on audio CD, all tracks are watermarked and traceable to the person who downloaded it.

Other than download time, the only significant limitation is the paucity of CD-R support, which the company says it is addressing. Be sure to check its Web site for CD-R compatibility before buying any audio tracks.

By reducing the cost of distribution and inventory, LiquidAudio should provide access to more new bands and a much more extensive library than any record store. Already, both major and independent record labels are signing on to this scheme.



BEYOND AUDIO: Liquid Audio provides cover art and lyrics.

ing, which successfully removed many of the isolated pops and clicks from our source material and created no artifacts.

Spin Doctor was the only program to offer both sensitivity controls and preview. The only downside is the wait—filtering took about 2.5 times the recording time on a 200-MHz Pentium MMX, the slowest time of the programs in this roundup. Another convenient feature is silence detection, which separates tracks from continuous music recorded with a tape or record player.

After recording our tape-based audio, we laid out tracks in CD Creator, which handles layout and print functions. Though the program offers an audio wizard, you probably won't need it, since program operation is so simple. You can select both WAV and CD audio tracks by dragging them from an Explorer-like source window into the track layout. On the play list you can enter the name of the song but not the album, which complicates multi-CD compilations.

You can edit all WAV tracks on the play list with Adaptec's Sound Editor, which has cut-and-paste capabilities and more advanced features such as graphic equalization. Once selected, you

Editors' Choice

• just!audio



If you are creating audio CDs, look no further than our Editors'

Choice winner, just!audio, from CeQuadrat (\$79 list).

Designed specifically for creating audio CDs, just!audio impressed us at every turn. Standout features include a database of 300,000 audio CDs from which you can speedily drag and drop track selections while creating audio CD compilations, a 500-image clip-art library, and the bundled CD-Stomper label applicator. The latter two complement

can either copy the CD audio track to disk, which improves reliability, or read the track from the source disk on-the-fly when burning the CD. Both methods worked well in our tests.

CD Creator excels at print-based output, providing templates for the front and back of the jewel case cover and disc label. You can layout text at 0, 90, 180 and 270 degrees, useful for labels on the jewel case spine. Images can be input as objects and edited with your own image editor from within CD Creator.

On the whole, CD Creator

just!audio's selection of jewel case templates.

The only things lacking are customized filter settings and a WAV audio editor, two features which are important only for those creating their own audio tracks. Plus, the colorful and graphical interface makes creating audio CDs easy and fun—and hey, that's what this is all about, right?

Adaptec's Easy CD Creator (\$99 list) merits an honorable mention for its dexterity as a full-featured, all-around CD-R program that supports both data and audio recording. Easy CD Creator has an excellent audio feature set that includes customizable filtering with preview and a competent WAV audio editor. The only drawback is that you have to navigate through two programs to access all audio-related features; also, CD Creator's interface is accessible, but it's not designed from the ground up to create audio CDs.

performed well on all of our tests, and its CDs played without incident on all four test players. An excellent general-purpose package that handles data as well as audio files, CD Creator is probably your best choice for converting cassette- and record-based assets to CD, and it is certainly a more than competent choice for all other audio-related CD-R tasks.

CeQuadrat (USA) Inc.

just!audio



just!audio, from CeQuadrat (\$79 list), boasts an engaging interface, extensive print functions, and an attractive, consumer-oriented bundle. Unfortunately, the program's filtering features are difficult to use, and they created slight artifacts in our test track. This makes just!audio ideal for anyone compiling tracks from various audio CDs, but not

the best choice for someone converting analog assets such as cassettes and records to CD.

The program is designed around four main windows, one each for laying

out your disk, creating artwork, selecting recording options, and burning the CD-ROM. The layout editor lets you record audio from analog sources, create tracks from WAV files on disk, or pull tracks from existing CDs. The recording interface includes dual volume meters and volume control. It also marks all gaps between tracks, so you can record an entire tape or LP in one operation instead of separately recording individual tracks.

After recording, you can filter out cracks and pops with the "declick" feature, trim the silence at the beginning and end of tracks, and select max volume in order to adjust audio volume to the loudest track. just!audio performs declicking in real time during recording, so you can preview the adjusted results before you burn the CD. The preview, however, doesn't offer any settings controls, which makes it less usable. Since we found some evidence of distortion in our filtering tests, we'd recommend that you use this feature with discretion. just!audio lacks a WAV editor, which is always useful.

When you place a CD-ROM in the drive, just!audio searches an internal database of 300,000 popular audio CDs; if a



AUDIO DATABASE: just!audio comes with track and title information for over 300,000 audio CDs.

just!audio

List price: \$79

Requires: 16MB RAM, 45MB hard disk space,

Microsoft Windows 95 or NT 4.0

CeQuadrat (USA) Inc., Palo Alto, CA; 650-843-3780; fax: 650-843-3799

www.cequadrat.com

Choose 410 at

www.pcmag.com/infolink

First Looks

match is found, the tracks will be listed by name. This makes it faster to create your CD, and it also fills in track name and artist information for the liner notes.

When you're ready to create the CD, the program presents two views of your writing options. The detailed view presents all the available options separately, while the easy view links all of the options on a slider bar along a continuum between fast and safe. This approach works well for all levels of users.

If you've elected to write your CD-based tracks on the fly, just!audio stops writing between tracks and asks for additional CDs by album name. Unfortunately, the program doesn't track the time remaining in the total burn, an irritating omission. On the whole, just!audio performed well on our test script and passed compatibility tests without a problem, an impressive performance.

just!audio provides templates for the inlay card, CD-booklet, and label, with support for four types of labels. Text capabilities are extensive, including amazing curved text for the CD label. The 500-image clip-art library contains some useful images; you can import your own images as well. Although the templates feel restrictive at times, the print function is very useful. CeQuadrat also ships just!audio with the CD Stomper label applicator and sample pack of CD-ROM labels and jewel case covers. In terms of both feature set and interface, just!audio is the perfect tool for compiling audio CDs. Unfortunately, the lack of a WAV editor and inadequate filtering controls make it less attractive to those working with source materials that deviate from digital audio formats.

Creative Digital Research

HyCD Music

Both the current and upcoming Java versions of Creative Digital Research's HyCD Music (\$59 list) lack several essential features, including the inability to work with WAV files or create CD labels and jewel case covers. These deficits disqualify the product from being an option for most home audiophiles interested in consolidating their CDs.

HyCD Music is available both as a standalone product and as a compo-

from CD to CD. HyCD works only on audio CD tracks; you can't burn WAV files from disk, a significant limitation for those who want to create or edit their own audio tracks.

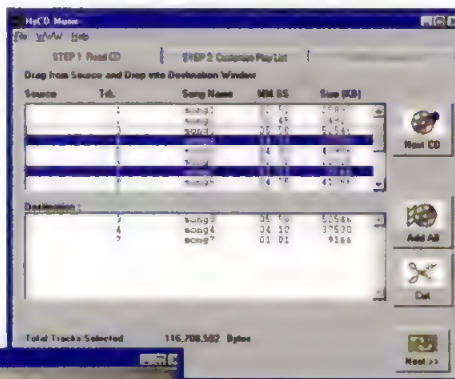
The program itself is largely

audio CD tracks. The final Java version will also contain CD labeling and printing options, which we were not able to test in our beta version.

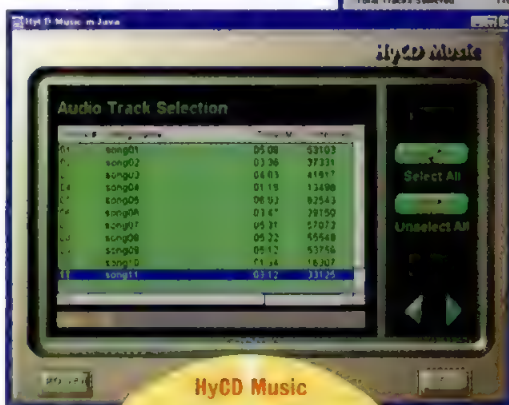
Appropriately, the program works almost like a Web browser, making your selections and then pressing an arrow to move to the next window. You select your tracks first and then place them on the play list, where you can change their order but little else. As with the standard version, no print output functionality is provided.

The standard version successfully creates CDs compatible with all tested players, but it also suffers from critical feature gaps as compared with its au-

diocentric competitors. The Java version seems to cover more of the critical functions the other products cover, but the interface we saw lacks some of the features presented by just!audio.



SNAPPY LOOK: HyCD Music Java (left) is one of the first desktop applications built in Java, and it is more feature-rich than its legacy version (above).



HyCD Music

List price: \$59

Requires: 16MB RAM,
11MB hard disk space for
program (70MB for music database,
1GB recommended for storage),
Microsoft Windows 3.x, 95, or NT 4.0

Creative Digital Research, San Jose, CA,
408 244 7007, fax (408) 244 7077

www.hyacd.com

Choose 412 at

www.pcmag.com/info/ink

nent of Creative Digital Research's HyCD Recording Suite, which is highly regarded for its hybrid CD-ROM creation capabilities (supporting Macintosh, Unix, and Windows 3.1 and 95). We also took an advance look at HyCD Suite 2.0, one of the first desktop applications written in Java.

The legacy version of HyCD is a bare-bones program that can copy audio CD tracks either from a hard disk or directly

composed of horizontal source and destination windows. The source window lists all tracks from your source CD, and you can drag down your track selections to the destination window. The program then copies all desired files to your hard disk, at which point you can customize the disk layout list by moving files up or down along the track list. There are also no audio editing capabilities.

When you've finished compiling your tracks, you can select your writing speed and choose to test the CD-R's ability to write at the requested speed before writing the final disk. There are no print-related functions, so you'll have to look to third-party programs to prepare your CD label and jewel case documentation.

The Java version of HyCD, in addition to dressing up the interface, ships with a utility that converts WAV tracks to

Elektroson Inc.

GEAR Audio

At a list price of \$99 (\$69 download), Elektroson's GEAR Audio lacks such consumer-oriented features as CD label and jewel case printing. Although certainly otherwise functional and easy to use, GEAR Audio is simply outfeared by its less expensive competitors.

The program interface consists of one large track window with a menu and icons on top. You can input either WAV or audio CD files into GEAR's track list, but you can't record audio from within the program.

GEAR was the only product that flagged incorrectly digitized files. It refused to input files that weren't 44-kHz, 16-bit stereo, which is the Redbook CD-Audio standard. Though GEAR is technically correct,



Imagine that.

Imagine the things
you'll do. The places
you'll go. Imagine
knowing no boundaries.
Embracing all possibilities.
Micron computers.
Imagine that.

CALL
and ask about our
WINDOWS 98
UPGRADE
OFFER



Imagine

that winning is everything.





TransPort
XKE
Feb. '98



Powerdigm
Xsu
Jan. '98



Millennia
Xku 300
Sept. '97



Millennia
Xku
#4 Power
Desktop
Jan. '98



Millennia
Xku
Jan. '98



Millennia
Pro2 200
Sept. '97



TransPort
Xke 166
Aug. '97



Customer
Service,
Support &
Reliability
Nov. '97



TransPort
Xke
Oct. '97



Envision a PC system built just for you. And let your imagination run wild.

Catch the brass ring. We've created some of the finest, most dependable, most innovative computer systems imaginable. But you don't have to take our word for it. Listen to the experts. Micron™ systems are consistently recognized for impeccable performance, reliability and value. Last year, we won over 200 awards, recommendations and stellar reviews from your favorite industry publications, like *PC Computing* and *PC Magazine*. And the 1998 awards are already pouring in.

Distinct possibilities. Picture this. Micron's sales representatives will custom configure a system perfect for you, while our award-winning technical support dream team is available seven days a week, 24 hours a day. And our products are covered by some of the best warranties in the business.

Dream on. It's not by accident *Home PC* readers ranked Micron number one for overall reliability and technical support last year. One look at Micron, and you'll clearly see the best PC values in the industry. Imagine how the competition pales next to Micron's unsurpassed performance, high technology and aboveboard support. Imagine everything you want to accomplish, and everything we've already achieved at Micron. And then imagine what we can do together.



Call now to order.
888-224-4152
www.micronpc.com

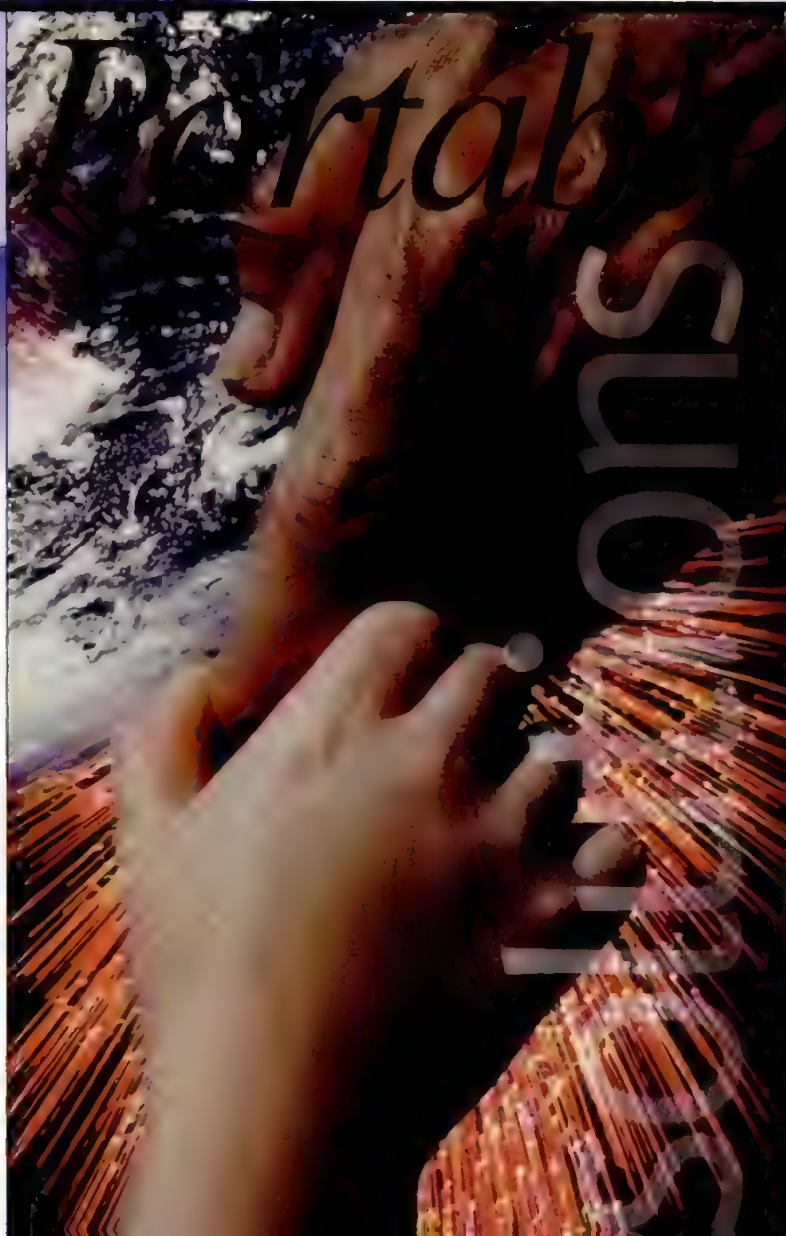


Configured For Your Life™

Total Solutions

Imagine

that the *world* is at your fingertips.



CALL
and ask about our
WINDOWS 98
UPGRADE
OFFER



With the award-winning Micron TransPort, it's all yours.

Higher power. The Micron™ TransPort® XKe has made a name for itself as an incomparable, high-performance portable PC. It's won three *PC Magazine* Editor's Choice awards — and with good reason. The TransPort XKe sets the pace for high-end portable power. The XKe features an Intel 233MHz or 266MHz Pentium® processor with MMX™ technology, and is upgradable to 192MB EDO RAM. Micron gives you the only portable with award-winning Dragon NaturallySpeaking Personal voice recognition software standard. The TransPort XKe has never been faster or more powerful. And, it's never been more affordable.

Light and bright. The Micron TransPort Vlx puts more power in a no-nonsense portable. Named *PC Computing's* 1997 Workhorse of the Year, the TransPort Vlx sets a new standard in portables. It's flexible. Lightweight. And it's powered by an Intel 166MHz Pentium processor with MMX technology. You can get it all for an unbeatable price, because the TransPort Vlx starts at a mere \$1,399! Call us now and imagine the places you'll go.

Portable Solutions

TransPort Vlx

166MHz Intel Pentium processor
with MMX technology
16MB EDO RAM
2.1GB hard drive
12.1 TFT SVGA, 800 x 600 display

256KB L2 pipeline burst cache
PCI bus with 128-bit graphics accelerator
MPEG compatible
Zoomed Video ready
Microphone and 16-bit stereo sound
20X modular CD-ROM drive
2-way infrared port
Modular floppy drive
Li-Ion battery
Microsoft® Windows® 95 and MS® Plus!
Choice of a Micron Portable
Software Solutions Pak
5-year/1-year Micron
limited warranty

\$1,399

Bus. lease \$49/mo.

TransPort XKe

233MHz Intel Pentium processor
with MMX technology
32MB EDO RAM
3GB removable hard drive
13.3" TFT XGA display

512KB pipeline burst cache
2 modular expansion bays
2 infrared ports, S-Video, NTSC, game, USB ports
20X CD-ROM drive with AutoPlay™ technology
128-bit, 2MB DRAM graphics
CardBus and Zoomed Video
16-bit stereo sound and microphone
56Kbps fax/modem*
Pick-a-Point™ dual pointing devices
Custom nylon carrying case
Microsoft Windows 95 and MS Plus!
Choice of a Micron Portable Software Solutions Pak
Microsoft Office 97 Small Business Edition
Dragon NaturallySpeaking Personal
voice recognition software
5-year/1-year Micron
limited warranty

\$2,699

Bus. lease \$92/mo.

* Maximum transmission speed of up to 56Kbps when downloading data and 33.6Kbps when uploading. However, actual performance is dependent upon numerous factors and observed transfer rates may be less than the maximum potentials.



Call now to order.
888-224-4152
www.micronpc.com



Configured For Your Life™

Imagine

that brilliance is a keystroke away.

CALL
and ask about our
WINDOWS 98
UPGRADE
OFFER



Micron Millennia systems.

Innovative. Inspired. Inviting.

Maximum acceleration. Introducing the Micron™ Millennia® 350 and 400 — a new dimension of PC performance ideally suited for uncompromising power users. Featuring the 400MHz Pentium® II processor, Micron unleashes the maximum level of horsepower available today in an Intel-based Millennia desktop PC. Or, feel the exhilaration of the new Micron Millennia 350 — it's the perfect desktop for multimedia gaming, for families, for home offices — for you.

The perfect PC. Whether your home computer is for business or for fun, our Millennia Personal line delivers high-tech, high-demand performance. Graphic-intense applications run beautifully, with memory and power to spare. The Millennia Personal includes the Microsoft® Home Essentials software bundle, modem and Zip drive. And if you order a Millennia system now, you'll receive a coupon book worth over \$200 of savings on leading Microsoft products.

You can also get the Millennia with DVD system for unsurpassed multimedia performance. Perfect for "edutainment" software. Perfect for cutting-edge 3D gaming. Perfect for you.



Millennia 300 Personal Edition

Intel 300MHz Pentium II processor
(features MMX™ technology)
32MB SDRAM
4.0GB Ultra ATA hard drive
15" Micron 500Fgx, .28dp monitor (13.7" display)

82440LX chip set
512KB internal cache, 2MB flash BIOS
3.5" floppy
32X EIDE variable speed CD-ROM drive
128-bit AGP 3D video with 4MB SGRAM
32 voice Wavetable stereo sound,
stereo speakers
56Kbps data/fax modem*
104-key enhanced keyboard
Microsoft IntelliMouse, USB connections
Microsoft Windows 95 and MS Plus!
Microsoft Home Essentials
5-year/3-year Micron Power
limited warranty

\$1,899

Cons. lease \$76/mo.

Millennia 350 Office Edition

Intel 350MHz Pentium II processor
(features MMX technology)
64MB SDRAM
6.4GB Ultra ATA hard drive
17" Micron 700 F6x, .26dp monitor (16" display)

82440BX chip set
512KB internal cache, 2MB Flash BIOS
3.5" floppy
32X EIDE variable speed CD-ROM drive*
128-bit AGP 3D video with 4MB SGRAM
10/100 PCI network adapter
64 voice PCI Wavetable sound, stereo speakers
104-key enhanced keyboard
Microsoft IntelliMouse, USB connections
Microsoft Windows 95 and MS Plus!
Microsoft Office 97 Small Business Edition
5-year/3-year Micron Power
limited warranty

\$2,499

Bus. lease \$87/mo.

* The CD-ROM drive will be removed upon the purchase of the DVD-ROM drive upgrade.
** Maximum transmission speed of up to 56Kbps when downloading data and 33.6Kbps when uploading. However, actual performance is dependent upon numerous factors and observed transfer rates may be less than the maximum potentials.

Call now to order.
888-224-4152
www.micronpc.com



Configured For Your Life™

Performance Desktop Solutions

Imagine

that your ideas are *heard* everywhere.

SOLUTIONS

Business



Total management is now within your reach.

One and only. The incomparable Micron™ ClientPro® 350 is redefining business computing. Engineered with Intel's latest 440BX chip set and the advanced 350MHz Pentium® II processors, the ClientPro 350's power and performance will surpass anything you've experienced before. Suddenly, multitasking is a dream. And because the ClientPro ships standard with Microsoft® Windows NT® on all enterprise products, so you'll get a virtually crash-proof, highly secure operating system.

Reach for the stars. Our network-ready ClientPro desktops give you everything you need in a business PC — at some of the lowest prices ever. The ClientPro runs the gamut from no-nonsense desktops to top-of-the-line, remotely-managed PCs. You'll lower ownership costs and get network integration — and the best remote and local management features. Our state-of-the-art engineering and management features make this the PC built for success.

Safe and sound. Micron NetFRAME® servers promise network integrity and manageability. Built from the ground up, you get the hardware and software you want, plus on-site technical support if you need it.

The sky's the limit. We build award-winning workgroup, departmental and enterprise servers — no job is too big or too small. Imagine your company's growth, security and potential. The possibilities are endless.



ClientPro 350

Intel 350MHz Pentium II processor
(featuring MMX™ technology)
64MB SDRAM
6.4GB SMART Ultra ATA hard drive
17" Micron 700FGx, .26dp (16" display)

32X variable speed ATAPI CD-ROM drive
Network adapter with 3Com Remote Wake-up™ capability
4MB AGP 3D video
Microsoft® IntelliMouse™
Intel LANDesk® Client Manager available
Microsoft Windows NT® Workstation 4.0*
5-year/3-year Micron Power™ limited warranty

\$2,499

Bus. lease \$87/mo.

NetFRAME MV5001

Intel 233MHz Pentium II processor
64MB ECC SDRAM
4GB Ultra Wide SCSI-3 hard drive
NOS support
(1 first-year incident resolution), 7x24

512KB integrated cache in SEC package
9 expansion slots: 6 PCI, 2 ISA, 1 shared ISA/PCI
Dual integrated Symbios Ultra Wide SCSI-3 controller
Integrated Symbios narrow SCSI controller
Intel EtherExpress™ Pro 100 network adapter
20X SCSI-2 CD-ROM drive
I₂O-ready via embedded Intel i960-RD
5 internal, hot-pluggable, hard drive array bays
(upgradable to 10)
1 360-watt hot-pluggable power supply standard
(upgradable to 3 for added redundancy)
Intel LANDesk® Server Manager 2.8
5-year/3-year Micron Power™ limited warranty
1-year next-business-day on-site service¹

\$3,799

Bus. lease \$121/mo.

¹On-site service for NetFRAME LV2001 and MV5001 servers is provided by Digital Equipment Corporation and is optional.

Business Solutions

Call now to order.
888-224-4152
www.micronpc.com



Configured For Your Life™

Imagine

that you unlock the *genius* within.



Workstation Solutions

Workstation Solutions

*Draw your own conclusions.
Paint your own canvas.
Mark your own words.
All with the Micron™ Powerdigm®.*

Put your head in the clouds. The award-winning Powerdigm workstation has become a coveted workstation for the most discerning user. The Powerdigm Xsu offers the perfect balance of performance, power and ingenuity. So perfect, *PC Magazine* named it the 1997 Workstation of the Year.

A masterwork station. This PC powerhouse, featuring Micron's own Samurai™ core logic, delivers 64-bit, 66MHz PCI bus performance, and the unbridled power of dual Pentium® II processors. Powerdigm is your quintessential, scalable graphics solution. You'll render high-demand graphics, financial programs or CAD applications without boundaries. And with more than 400MB per second throughput, bottlenecks are a thing of the past. Called "the most exciting PC on the planet" by *PC Magazine* — none of our competitors have even come close. Call us and see why. Imagine a work of art. A stroke of genius. And then imagine the power you'll have.



Powerdigm Xsu

Intel 300MHz Pentium II processor
(features MMX™ technology)
64MB ECC SDRAM
4GB Ultra Wide SCSI-3 hard drive
19" Hitachi SuperScan CM751
(18" display) .26dp color monitor

Supports dual processors
Samurai chip set
512KB pipeline burst cache, flash BIOS
Memory upgradable to 1GB ECC SDRAM
Supports IDE Ultra ATA and multiple
Ultra Wide SCSI-3 hard drives
20X variable speed SCSI CD-ROM drive
Fire GL 1000 pro 8MB 66MHz PCI Open GL
Professional 3D accelerator
3Com Fast EtherLink XL 10/100 PCI network adapter
Wavetable stereo sound with speakers
Microsoft® Windows NT® Workstation
DMI, software and hardware
management support
5-year/3-year Micron Power™
limited warranty

\$3,599

Bus. lease \$114/mo.

Call now to order.
888-224-4152
www.micronpc.com



Configured For Your Life™

Portable Solutions

System Configurations

TransPort® XKE

**166MHz Intel Pentium processor
with MMX technology
32MB EDO RAM
3GB removable hard drive
13.3" TFT XGA display**

512KB pipeline burst cache
2 modular expansion bays
2 infrared ports, S-Video, NTSC, game, USB ports
20X CD-ROM drive with AutoPlay™ technology
128-bit, 2MB DRAM graphics
CardBus and Zoomed Video
16-bit stereo sound and microphone
56Kbps fax/modem*
Pick-a-Point™ dual pointing devices
Custom nylon carrying case
Microsoft Windows 95 and MS Plus!
Choice of a Micron Portable Software Solutions Pak
Microsoft Office 97 Small Business Edition
Dragon NaturallySpeaking Personal
voice recognition software
5-year/1-year Micron
limited warranty

\$2,199

Bus. lease \$77/mo.

TransPort VLX

**166MHz Intel Pentium processor
with MMX technology
16MB EDO RAM
2.1GB hard drive
12.1 TFT SVGA, 800 x 600 display**

256KB L2 pipeline burst cache
PCI bus with 128-bit graphics accelerator
MPEG compatible
Zoomed Video ready
Microphone and 16-bit stereo sound
20X modular CD-ROM drive
2-way infrared port
Modular floppy drive
Li-Ion battery
Microsoft Windows 95 and MS Plus!
Choice of a Micron Portable
Software Solutions Pak
5-year/1-year Micron
limited warranty

\$1,399

Bus. lease \$49/mo.

TransPort XKE

**266MHz Intel Pentium processor
with MMX technology
32MB EDO RAM
3GB removable hard drive
13.3" TFT XGA display**

512KB pipeline burst cache
2 modular expansion bays
2 infrared ports, S-Video, NTSC, game, USB ports
24X CD-ROM drive with AutoPlay technology
128-bit, 2MB DRAM graphics
CardBus and Zoomed Video
16-bit stereo sound and microphone
56Kbps fax/modem*
Pick-a-Point dual pointing devices
Custom nylon carrying case
Microsoft Windows 95 and MS Plus!
Choice of a Micron Portable Software Solutions Pak
Microsoft Office 97 Small Business Edition
Dragon NaturallySpeaking Personal
voice recognition software
5-year/1-year Micron
limited warranty

\$3,199

Bus. lease \$109/mo.

TransPort VLX

**166MHz Intel Pentium processor
with MMX technology
40MB EDO RAM
2.1GB hard drive
12.1 TFT SVGA, 800 x 600 display
56Kbps fax/modem
Microsoft Office Small Business Edition**

256KB L2 pipeline burst cache
128-bit graphics accelerator
MPEG compatible
Zoomed Video ready
Microphone and 16-bit stereo sound
20X modular CD-ROM drive
2-way infrared port
Modular floppy drive
Li-Ion battery
Custom nylon carrying case
Microsoft Windows 95 and MS Plus!
Choice of a Micron Portable
Software Solutions Pak
5-year/1-year Micron
limited warranty

\$1,899

Bus. lease \$66/mo.



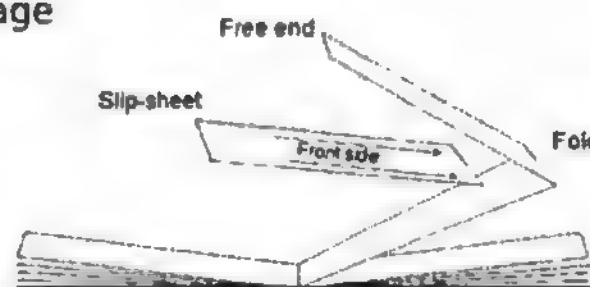
CALL
and ask about our
**WINDOWS 98
UPGRADE
OFFER**

Call now to order.
888-224-4152
www.micronpc.com

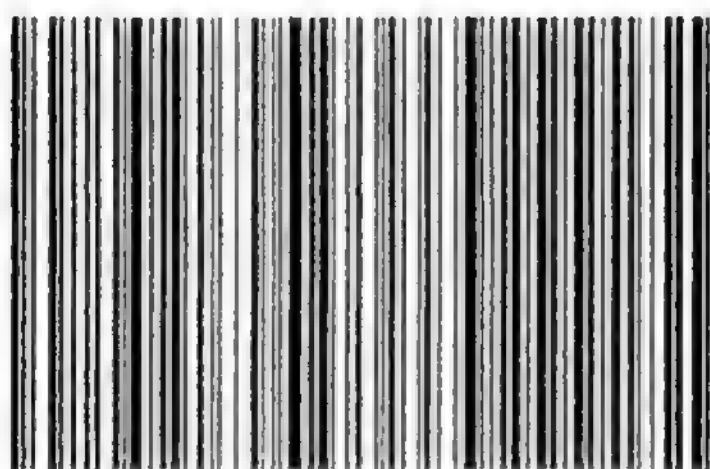


Configured For Your Life™

1. Open the foldout page
2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet



Foldout slip-sheet



GbsSlipSheet-001

Inverted Foldout slip-sheet

Folded edge of the page

1. Open the foldout page

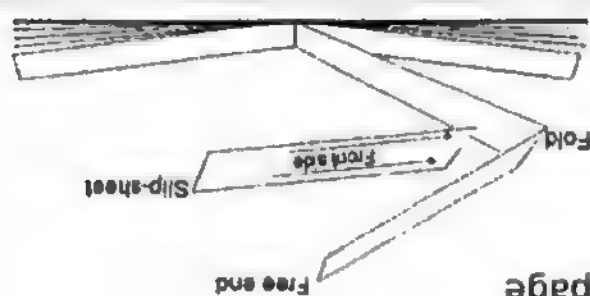
2. Insert this sheet with

1. Front side touching the free page

2. Arrow pointing to the fold

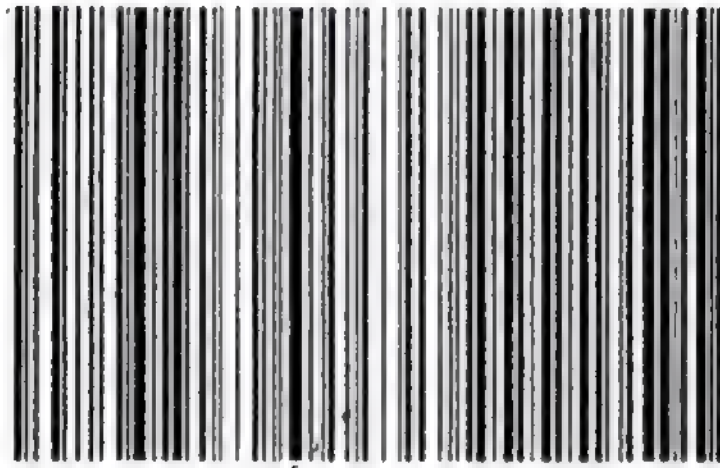
3. Slice the folded edge

4. Close the page and slip-sheet



1. Follow instructions on the other side

Inverted Back



GbsSlipBack-0018

Back

1. Follow instructions on the other side

Performance Desktop Solutions

Millennia® 300 Personal Edition

Intel 300MHz Pentium® II processor
(features MMX™ technology)
32MB SDRAM
4.0GB Ultra ATA hard drive
15" Micron 500FGx, .28dp monitor (13.7" display)

82440LX chip set
512KB internal cache, 2MB flash BIOS
3.5" floppy
32X EIDE variable speed CD-ROM drive
128-bit AGP 3D video with 4MB SGRAM
32 voice Wavetable stereo sound,
stereo speakers
56Kbps data/fax modem*
104-key enhanced keyboard
Microsoft® IntelliMouse™, USB connections
Microsoft Windows® 95 and MS® Plus!
Microsoft Home Essentials
5-year/3-year Micron Power™
limited warranty

\$1,899

Cons. lease \$76/mo.

Millennia 400 DVD Edition

Intel 400MHz Pentium II processor
(features MMX technology)
64MB SDRAM
8.4GB Ultra ATA hard drive
17" Micron 700 FGx, .26dp monitor (16" display)

82440BX chip set
512KB internal cache, 2MB Flash BIOS
Integrated 100MB Iomega Zip drive, 3.5" floppy
DVD-ROM drive and PCI decoder card
128-bit AGP 3D video with 4MB SGRAM
64 voice PCI Wavetable sound, speakers with
powered subwoofer
56Kbps data/fax modem**
104-key enhanced keyboard
Microsoft IntelliMouse, USB connections
Microsoft Windows 95 and MS Plus!
Microsoft Home Essentials
5-year/3-year Micron Power
limited warranty

\$3,099

Cons. lease \$123/mo.

Millennia 350 Office Edition

Intel 350MHz Pentium II processor
(features MMX technology)
64MB SDRAM
6.4GB Ultra ATA hard drive
17" Micron 700 FGx, .26dp monitor (16" display)

82440BX chip set
512KB internal cache, 2MB Flash BIOS
3.5" floppy
32X EIDE variable speed CD-ROM drive*
128-bit AGP 3D video with 4MB SGRAM
10/100 PCI network adapter
64 voice PCI Wavetable sound, stereo speakers
104-key enhanced keyboard
Microsoft IntelliMouse, USB connections
Microsoft Windows 95 and MS Plus!
Microsoft Office 97 Small Business Edition
5-year/3-year Micron Power
limited warranty

\$2,499

Bus. lease \$87/mo.

Millennia 400 Office Plus Edition

Intel 400MHz Pentium II processor
(features MMX technology)
64MB SDRAM
8.4GB Ultra ATA hard drive
17" Micron 700 FGx, .26dp monitor (16" display)

82440BX chip set
512KB internal cache, 2MB Flash BIOS
Integrated 100MB Iomega Zip drive, 3.5" floppy
32X EIDE variable speed CD-ROM drive*
128-bit AGP 3D video with 4MB SGRAM
10/100 PCI network adapter
64 voice PCI Wavetable sound, stereo speakers
104-key enhanced keyboard
Microsoft IntelliMouse, USB connections
Microsoft Windows 95 and MS Plus!
Microsoft Office 97 Small Business Edition
5-year/3-year Micron Power
limited warranty

\$2,899

Bus. lease \$99/mo.

* The CD-ROM drive will be removed upon the purchase of the DVD-ROM drive upgrade.

** Maximum transmission speed of up to 56Kbps when downloading data and 33.6Kbps when uploading. However, actual performance is dependent upon numerous factors and observed transfer rates may be less than the maximum potentials.

Business Solutions

NetFRAME® LV2001

Intel 233MHz Pentium® II processor
32MB ECC SDRAM
4GB Ultra Wide SCSI-3 hard drive
NOS support
(1 first-year incident resolution), 7x24

512KB integrated cache in SEC package
ECC SDRAM option (4 DIMM slots)
5 expansion slots: 4PCI, 1 ISA
Integrated Adaptec PCI Ultra Wide SCSI-3 controller
Intel EtherExpress™ Pro 100 network adapter
20X SCSI-2 CD-ROM drive
Upgradable to 36GB storage
Intel LANDesk® Server Manager 2.8
5-year/3-year Micron Power limited warranty
1-year next-business-day on-site service¹

\$2,399

Bus. lease \$84/mo.

NetFRAME MV5001

Intel 233MHz Pentium II processor
64MB ECC SDRAM
4GB Ultra Wide SCSI-3 hard drive
NOS support
(1 first-year incident resolution), 7x24

512KB integrated cache in SEC package
9 expansion slots: 6 PCI, 2 ISA, 1 shared ISA/PCI
Dual integrated Symbios Ultra Wide SCSI-3 controller
Integrated Symbios narrow SCSI controller
Intel EtherExpress Pro 100 network adapter
20X SCSI-2 CD-ROM drive
I₂O-ready via embedded Intel i960-RD
5 internal, hot-pluggable, hard drive array bays
(upgradable to 10)
1 360-watt hot-pluggable power supply standard
(upgradable to 3 for added redundancy)
Intel LANDesk Server Manager 2.8
5-year/3-year Micron PowerSM
limited warranty
1-year next-business-day
on-site service¹

\$3,799

Bus. lease \$121/mo.

ClientPro® 200

Intel 200MHz Pentium processor with MMX technology
32MB EDO RAM, support for SDRAM
2.1GB SMART EIDE hard drive
15" Micron 500Lx, .28dp (13.7" display)

Microsoft Windows NT
Workstation 4.0
5-year/3-year Micron Power
limited warranty

\$1,199

Bus. lease \$42/mo.

ClientPro 266

Intel 266MHz Pentium II processor
(featuring MMX™ technology)
64MB SDRAM
3.2GB SMART Ultra ATA hard drive
17" Micron 700FGx, .26dp (16" display)

24X variable speed ATAPI CD-ROM drive
Network adapter with 3Com Remote
Wake-up™ capability
4MB AGP 3D video
Microsoft® IntelliMouse™
Intel LANDesk Client Manager available
Microsoft Windows NT Workstation 4.0*
5-year/3-year Micron Power
limited warranty

*Additional Microsoft software or operating system options available.

\$1,899

Bus. lease \$66/mo.

ClientPro 350

Intel 350MHz Pentium II processor
(featuring MMX technology)
64MB SDRAM
6.4GB SMART Ultra ATA hard drive
17" Micron 700FGx, .26dp (16" display)

32X variable speed ATAPI CD-ROM drive
Network adapter with 3Com Remote Wake up capability
4MB AGP 3D video
Microsoft IntelliMouse
Intel LANDesk Client Manager available
Microsoft Windows NT Workstation 4.0*
5-year/3-year Micron Power
limited warranty

*Additional Microsoft software or operating system options available

\$2,499

Bus. lease \$87/mo.

¹On-site service for NetFRAME LV2001 and MV5001 servers is provided by Digital Equipment Corporation and is optional.

MICRON POWERSM WARRANTY

5-year limited warranty on microprocessors and main memory.
5-year limited parts-only system warranty¹¹ year for TransPort systems.
1- or 3-year optional on-site service agreement for Micron desktop and server systems.
30 days of free Micron-supplied software support for Micron desktop systems. 3 optional network operating system incident resolutions included for Micron server systems.
30-day money-back policy.
24-hour technical support.
The foregoing is subject to and qualified by Micron's standard limited warranty and terms and conditions of sale. Terms and conditions of sale may vary by specific configurations. Copies of the limited warranty may be obtained on our Web site or by calling Micron.

Micron Sales Hrs: Mon-Fri 6am-10pm, Sat 7am-5pm, Sun 10am-5pm (MT)
Technical Support Available 24 Hours A Day, 7 Days A Week
Toll-free from Mexico: 95-800-708-1755
Toll-free from Canada: 800-708-1758
Toll-free from Puerto Rico: 800-708-1756
International Sales: 208-893-8970
International Fax: 208-893-7393

©1998 Micron Electronics, Inc. All Rights reserved. Micron Electronics is not responsible for omissions or errors in typography or photography. All purchases are subject to availability. Prices and specifications may be changed without notice; prices do not include shipping and handling and any applicable taxes. 30-day money-back policy does not include return freight and original shipping/handling charges; applies only to Micron brand products and begins from date of shipment. All sales are subject to Micron Electronics' current terms and conditions of sale. Business lease prices based on 36-month lease, and consumer lease prices are based on 30-month lease. The Intel Inside Logo and Pentium are registered trademarks and MMX is a trademark of Intel Corporation. Microsoft, Windows, Windows NT and the Windows logo are registered trademarks of Microsoft Corporation. Product names of Micron products are trademarks or registered trademarks of Micron Electronics, Inc., or NetFRAME Systems Incorporated. Other product names used in this publication are for identification purposes only and may be trademarks of their respective companies.

Call now to order.
888-224-4152
www.micronpc.com



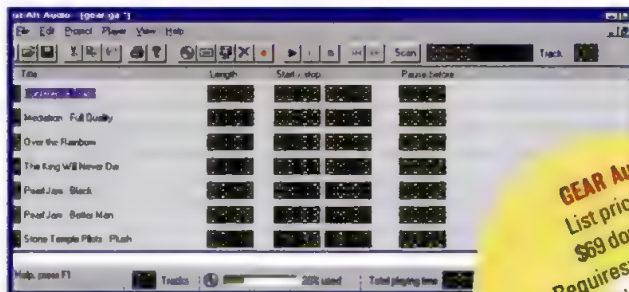
Configured For Your Life™

First Looks

the same incorrectly digitized files played without a problem when written to a CD with other programs; a better approach would have been to allow us to load the files after warning us about potential difficulties.

When working with CD-based audio tracks, GEAR has no on-the-fly recording capabilities; it writes all tracks to your hard disk once selected. Although this takes extra time and disk space, it virtually prevents buffer under-runs, which occur more frequently when writing directly from CD.

Once you select a track, you can add a title and adjust the pause before the track begins to play. GEAR lets you access your audio editor from the track list, and it protects the original file by allowing you to select an alternative destina-



MIND THE GAP: GEAR Audio has the ability to set the duration of the pauses between tracks.

tion for the edited version.

You can also filter the track using third-party "declick" and "descratch" utilities, a process that occurs very quickly within the main window. Nevertheless, during filtering, GEAR writes over the original file without warning; there is no preview function to test the effects of the filtering.

Our tests revealed that filter-

ing produced little benefit, but it also did no damage, with the filtered track sounding only slightly less noisy than the original. The CD produced by GEAR played in all four tested CD readers.

GEAR's printing capabilities are limited to printing a track list; it has no layout functions. For

those who like to dress up their CDs and jewel cases, this places GEAR at a distinct disadvantage compared with just!audio and Easy CD Creator Deluxe, both of which provide extensive print capabilities.

In the end, GEAR Audio does the job. Nevertheless, it is simply overshadowed by competitors with better features. Though it

is certainly an acceptable program if received in a bundle with a CD-R drive, it should not be your first choice when you're seeking a soup-to-nuts program to create audio CDs. **PC**

GEAR Audio
List price: \$99
\$69 download
Requires: 16MB RAM,
5MB hard disk space for program,
(800MB for temporary storage),
Microsoft Windows 95
or NT 4.0
Elektron Inc., Campbell, CA.
800-606-6118, 408-371-4800
www.elektron.com
Choose 411 at
www.pcmag.com/infolink

Getting Creative with CD Labels

If price were no object, anyone with a CD-R drive would own the Fargo Signature CD Color Printer (\$1,295 list). Though the bundled software is merely adequate, output quality is superior to any desktop option we've seen. This makes Signature ideal for businesses selling expensive, short-run CDs, and other users who place a premium on output quality.

The Signature is a thermal ink jet printer capable of up to 600- by 300-dpi output in either 24-bit color (CMY) or black monochrome. Fargo bundles a simple label designer, Compact Disk Image Designer (CDID), though you can use any graphics program to create your labels.

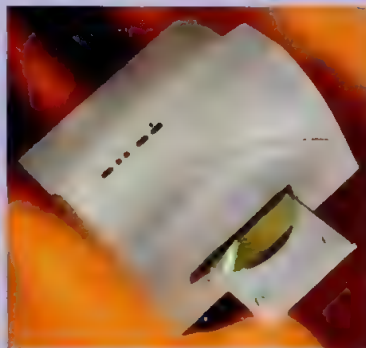
The Signature supports only printable-surface CD-Rs, which are available for around \$30 for a tenpack. Fargo's Tuff-Coat CD-R media costs about \$4 per unit, while the printer cartridges cost \$52.95 per CD for CMY color and \$39.95 for black monochrome.

We used the bundled software, an aging 16-bit product called CDID, for all our tests. You start by selecting from among the various templates for CD-R labels and jewel case documentation. You then can enter text horizontally or at 90, 180, and 270 degree orientation. You can also curve your text to match the CD-R's rounded edges.

Other design tools draw lines, curves, circles, and boxes; input bitmapped files; and change the color of all objects. Although CDID has a few impressive features, such as serialized bar-code

output, we expect more from a program that's bundled with a \$1,295 printer. That said, given time and patience you can achieve very good results using CDID. Nevertheless, many users will simply opt to use their own graphics program.

To test the Signature's output, we created several CD labels and jewel case liners, some with 24-bit graphics and text and others composed primarily of text. In 600-by-300 mode, output time ranged from 2.5 minutes for a simple text label to 6.5 minutes for a label filled with graphics.



SURFACE PRINTS: The Fargo Signature CD's thermal ink jet printer.

We tested using Fargo's Tuff-Coat CD-R media, which dried to the touch seconds after printing and didn't bleed when rubbed vigorously with a cloth. All printed text was remarkably clear and crisp. Full color images were slightly grainy with occasional cracks, but output quality far exceeds that of the ink jet printer used for our other tests in the roundup.

If image is everything in your business, buy the Signature and work around its software limitations. Otherwise, find a cheaper solution for your CD-R printing needs.

Fargo Signature CD Color Printer. List price: \$1,295. Requires: 8MB RAM, 100MB hard disk space, Microsoft Windows 95 and NT 4.0. Fargo Electronics Inc., Eden Prairie, MN; 800-327-4622, 621-941-9470; www.fargo.com. Choose 413 at www.pcmag.com/infolink.

Developers: get the at a price you can't



*Includes a limited license for development and testing only; BackOffice license limited to ten (10) simultaneous connections. ** Offer good through June 30, 1998. While supplies last. No shipping or handling costs.
© 1998 Microsoft Corporation. All rights reserved. Microsoft, BackOffice, Visual Basic, Visual C++, Visual Studio, Windows, and Windows NT are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.

power you need ignore.

For a limited time, get the power and stability of Microsoft Windows NT Workstation or BackOffice Server 4.0 Developer Editions, free when you acquire a select Visual Tool.

Take your pick.



Choose the Professional Edition of the Microsoft Visual Basic® version 5.0, Visual C++® version 5.0, or Visual Studio™ 97 development systems, and get Microsoft Windows NT Workstation 4.0 Developer Edition* free. That's right. The most powerful desktop operating system for developing business applications with the reliability and security of Windows NT. Absolutely free. No shipping, no handling — Free.

Or, if you're building enterprise solutions, choose the Enterprise Edition of one of these same Visual Tools and get BackOffice Server 4.0 Developer Edition* — free. This suite of application servers, including Microsoft Windows NT Server, Microsoft Exchange Server and SQL Server™ help you build comprehensive business-critical, client/server solutions.

Either way you get the high performance and stability of Windows NT, along with the most powerful, easy-to-use visual development tools for building client/server, Internet, Intranet, and Windows-based solutions.

This offer is too good to ignore. But it's only good for a limited time**. So act now. Visit your nearest reseller or call (888) 229-0738 to order. Then go to www.microsoft.com/developer/offer to get further details and to find out how to redeem your free copy of Windows NT Workstation 4.0 or BackOffice Server 4.0. All redemption will be accessed via a coupon on the web.



First Looks

CORPORATE MANAGED PCs

Meet the TCO Challenge

Toshiba's new Equium 7000S Pentium II-based slimline desktop PC takes serviceability to a new level.

By Carol Venezia

If you think that beige box sitting under your desk or propping up your monitor is just another innocuous piece of rectangular plastic, think again. Ever since the acronym TCO started rolling off people's tongues as easily as "www," virtually every PC vendor hawking its wares to large corporations has redesigned its computer cases to ease serviceability and lower maintenance costs.

To this fray we welcome Toshiba, with its new, decidedly unbeige Equium 7000S slimline machine. This system may not appear different from the rest at first. Take a closer look, however, and you'll find not only how easy PC service can be, but also what happens when a company takes a serious look at a problem and actually goes a long way toward solving that problem.

JUST OPEN THE DOOR

The most common reason why people crack open their PC cases is to upgrade or add components, usually memory. If you've done this before, you know what it involves: Unplugging everything first and then either off-loading your monitor or diving under your desk in the dark amidst the dust balls. If you've got an Equium 7000S, however, you won't even have to move the monitor, and you definitely won't end up with a snootful of dirt for your trouble.

Toshiba's innovations with this machine start with its Easy

Access Door. Located on the left side of the machine, this door comes off easily after pushing the release latch on top of the case. On the inside

of the door, there are diagrams showing you the location of various system components.

Toshiba crafted this door to provide easy access to internal components for upgrades. When the door is removed, the front inches of the motherboard are exposed. At the front, there's a lever which, when pulled forward, releases the motherboard so you can slide it out for servicing without having to remove any screws (it's mounted on standard rails).

If you want to upgrade system or video memory, you don't even have to take out the motherboard. Both components are seated right up front. But the real beauty of this design is that if your monitor is sitting on top of the case, you don't have to move it in order to upgrade

main memory or video memory or to change the motherboard. Instead, just flip open the door.

MORE COST-REDUCERS

In order to address cost reductions further, Toshiba has heavily leveraged Intel's NLX motherboard specification—in fact, all Equiums in the 7000 line (including full-size desktops) use the same motherboard. For corporations, this means having to qualify only one motherboard, which saves both time and money.

The NLX motherboard specification allows Toshiba to produce a system in which the actual main board resides inde-

SO WHAT'S IN THE BOX?

The Equium 7000S that we tested for this review came loaded with a 266-MHz Pentium II processor, 64MB of RAM, a 4GB hard disk, and a 24X CD-ROM drive (\$2,370 street, with monitor). On our benchmark tests, the system performed as we expected for a PC of its caliber.

Toshiba also has build-to-order models available, so you can pick your CPU (233- to 333-MHz Pentium II) as well as other components, including hard disk, RAM, CD-ROM or DVD drive. Our test machine also featured an integrated Intel Fast Ethernet adapter, which supports Wake On LAN (also a build-to-order option included in the above price). Toshiba's Secure Sleep function is enabled, so you can put the PC into a fully secured, password-protected, low-power state.

Also worthy of note is the flexible design of the slimline chassis.

You can put it in any of three locations: on your desk with your monitor sitting on top (the case is designed only to support up to a 17-inch CRT), on its side (there is an integrated swivel foot that you can rotate to stand it upright), or even mounted on a wall using standard mounting hardware.

If you are tired of the problems and expenses associated with qualifying and maintaining a fleet of PCs, Toshiba's Equium line offers a great solution. **Toshiba Equium 7000S.** Street price: \$2,370, with 266-MHz Pentium II CPU, 64MB RAM, 4GB hard disk, 24X

CD-ROM drive, Fast Ethernet card, and 17-inch monitor. Toshiba America Information Systems, Inc., Irvine, CA. 888-598-7802; fax: 714-457-7777; computers.toshiba.com. Choose 414 at www.pcmag.com/infolink.



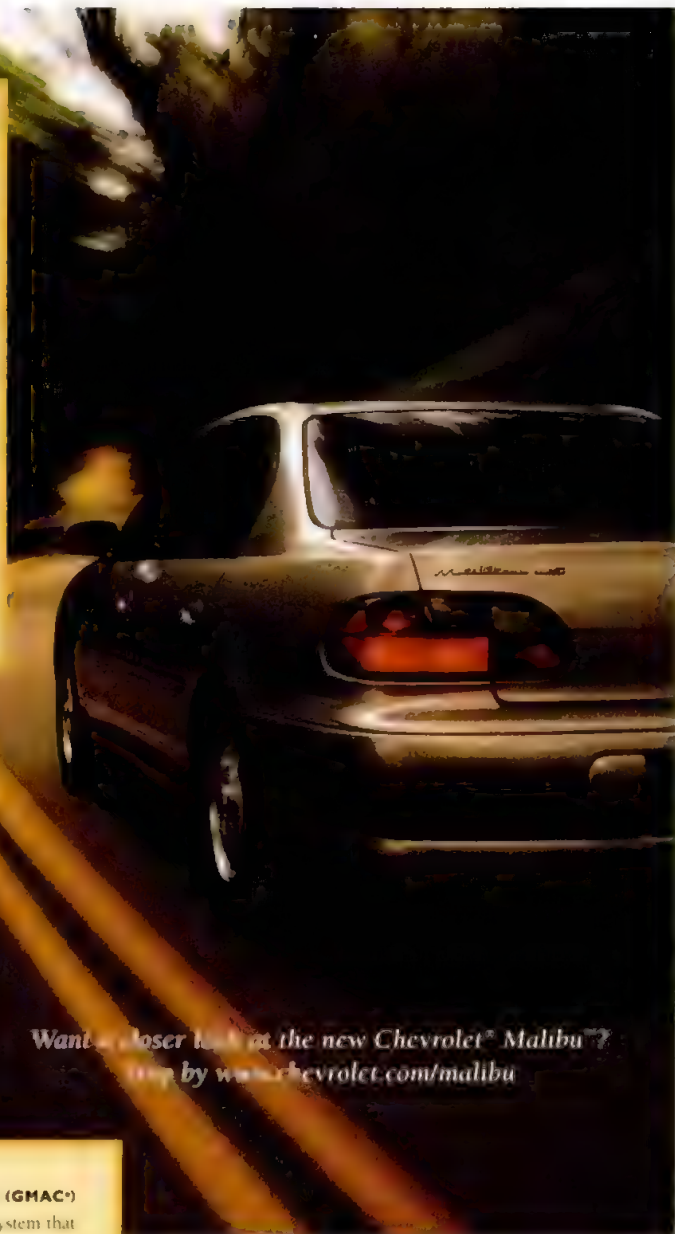
EASY UPGRADES: Pop off the Toshiba Equium 7000's Easy Access Door and you'll find diagrams illustrating the locations of the main components (below). Pull a lever to release the motherboard, which then simply slides out without disconnecting anything else.



pendent of a riser card containing the PCI and ISA expansion slots as well as all drive and cable connections. What this means is that you don't have to disconnect anything to get the motherboard out of the PC.

HOW DID GMAC ACCELERATE THE WHOLE COMPANY?

*Windows NT Workstation
and Kingston memory.*



Want a closer look at the new Chevrolet® Malibu™? Visit us by www.chevrolet.com/malibu



WHEN GENERAL MOTORS ACCEPTANCE CORPORATION (GMAC®) went shopping for a new operating system, they wanted a system that would perform across the whole enterprise. Their search quickly led

them to a logical destination: Microsoft® Windows NT® Workstation and Kingston® memory. The results? Having enough memory on every desktop allowed Windows NT Workstation to deliver the performance GMAC was after. And with true multitasking, 32-bit support, and the added memory, people throughout the company gained 30 to 60 minutes of productivity per day. "Windows NT Workstation gave us the enterprise solution we were looking for," said Louis Polite, GMAC's global infrastructure manager. "And

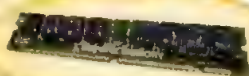
www.kingston.com/gmac

loading our desktops with Kingston memory made the whole migration much easier—for us and our users. Thanks to Kingston and Microsoft, we've taken the whole enterprise to the next level of computing." Want a solution that works for your company today and for the long haul? Call (888) 435-2367. Or visit our Web site at www.kingston.com/gmac.



Kingston
TECHNOLOGY
COMPUTING WITHOUT LIMITS.™

Microsoft®



Kingston Technology Company, 17600 Newhope Street, Fountain Valley, CA 92708 USA, (714) 435-2600, Fax (714) 435-2699. © 1998 Kingston Technology Company. All rights reserved. Computing Without Limits is a trademark of Kingston Technology Company. Microsoft and Windows NT are registered trademarks of Microsoft Corporation. General Motors and Chevrolet are registered trademarks and Malibu and the Malibu Emblem are trademarks of the General Motors Corporation. GMAC is a registered trademark of the General Motors Acceptance Corporation. All other trademarks and registered trademarks are the property of their respective owners.



THERE'S A VERY GOOD REASON EUROPEAN MONITORS
ARE ENGINEERED TO A HIGHER STANDARD.

Pictured above is a Nokia 21" 445Xpro (20" VIS), the industry's first 121kHz monitor with 1800 x 1440 resolution, up to 80Hz refresh rate and .22mm horizontal dot pitch.
©1998 Nokia Display Products, Inc. Specifications subject to change. All other trademarks are the sole property of their respective companies.



IT'S THE LAW.

Granted, it's not easy to build monitors for the world's strictest quality standards. Or to pass the rigorous tests demanded by ISO-9241-3, TCO and NUTEK. But as a result, our monitors come with pinpoint clarity and faster refresh rates, for reduced eyestrain. Remarkably low emissions. And an unsurpassed level of reliability.

While in some corners of the world all this might be considered a luxury, in Europe it's just the way things are done. And it's your assurance that with Nokia, you'll always see a world of difference.

For more information on our full line of 15" to 21" monitors, please call 1-800-BY-NOKIA, or visit us at www.nokia.com/americas.

NOKIA
CONNECTING PEOPLE

First Looks

HAND-HELD COMPUTERS

Colorful Colorless H/PC

Philips' Velo 500 holds the line on H/PC size and display to keep bulk down and battery life up.

By Bruce Brown

Though several manufacturers have changed the form factors or added color displays to their second-generation Windows CE H/PCs, Philips Mobile Computing Group took a conservative route in designing the Philips Velo 500. There are several performance enhancements, but the Velo 500 looks and feels like the earlier version and sticks with a monochrome display.

There are currently two versions of the Velo 500. One model has 16MB of EDO DRAM and 16MB of fast page mode ROM. The other (\$750 street) comes with an additional preinstalled 8MB DRAM miniature card,

for a total of 24MB of DRAM. The two models are otherwise identical, including their 75-MHz, 3.3V, 32-bit MIPS-based Philips PR31700 RISC processors. At 15.3 ounces and 1.0 by 6.75 by 3.75 inches (HWD) and with NiMH batteries installed, the Velo 500 is the same size and weight as the original.

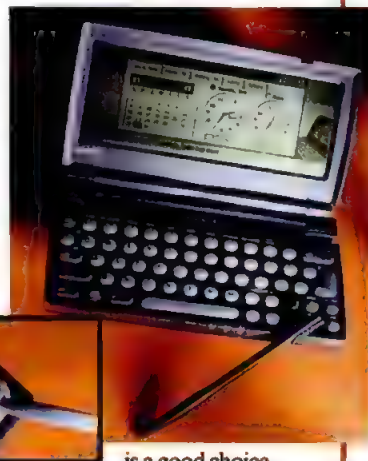
A 6.25-inch-diagonal monochrome display runs at a resolution of 640-by-240, with 16 shades and a 0.23-mm dot pitch. The 61 keys present the typical hand-held computing compromise. In this case, the Chiclet-style keys have little tactile feedback, reinforcing the Velo 500's role for referencing information, typing short notes, and perform-

ing other minor editing tasks.

The Velo 500 comes with a low-power 28.8-Kbps modem (bumped up from 19.2 Kbps in the original Velo) with a pop-up RJ-11 jack. A PC Card slot is omitted in favor of two miniature card slots and the integral modem, though a \$90 optional Type II PC Card V-Module will let you add PCMCIA cards.

The voice recorder works with the case closed and allows you to save 16 minutes of voice audio with just 1MB of memory. The Velo 500 comes with an AC adapter/battery charger, a docking unit, and a serial cable. Bundled software includes All-Pen Mobile Forms Database, Velo Voice Memo, and the standard complement of Windows CE software.

If you don't care about a color display but want a fast H/PC with an integral modem, the Velo 500



LOG ON: Connect to the Velo 500's 28.8-Kbps modem through its pop-out RJ11 jack.

is a good choice.

Philips Velo 500. Street price: \$640. Philips Mobile Computing Group, Campbell, CA; 888-367-8356, 408-558-2200; www.velo.philips.com. Choose 408 at www.pcmag.com/infolink.

MININOTEBOOKS

Libretto, Take III

Toshiba brings new features to its Lilliputian portable, including a faster processor and larger hard disk.

By Carol Venezia

If you refuse to carry a computing device larger than a paperback novel, you must have a full-blown version of Windows 95, and you've got about \$2,500 to spend, Toshiba has a solution: the Libretto 100CT. With this, the third generation of the Libretto, Toshiba beefs up three key components—CPU, storage, and graphics. This machine is not cheap, but for the right application it may be priceless.

The Libretto 100CT has bulked up a bit from the Libretto 70CT in terms of size and weight. This new unit measures 1.4 by 8.3 by 5.2 inches (HWD) and weighs in at 2.4 pounds. But Toshiba has put the extra housing to good use, outfitting the Libretto 100CT with a much better display.

With this model, you'll get a 7.1-inch-diagonal active-matrix panel capable of displaying 800-by-480-pixel, 16-bit color. And with Toshiba's display-stretch technology, you'll be able to pan to a comfortable 800-by-600.



THINK SMALL: The Toshiba Libretto 100CT is as close as it gets to a full-powered, pocket-size notebook.

The Libretto draws its juice from a 166-MHz Pentium/MMX CPU. Not only is the CPU itself faster, but thanks to a more advanced process technology it draws less power, giving you longer battery life. L1 cache is doubled from 16K to 32K, which should help performance as well.

You'll also enjoy more storage space with the Libretto. The system's hard disk has been upped from 1.6GB to 2GB. Standard and maximum memory capacity is also an area that Toshiba has improved. Now there's 32MB of standard EDO DRAM, upgradable to 64MB. Also new is a Fast IR transceiver and a second Type II PC Card slot (stacked on top of the first, so you can install a Type III device), which is both ZV- and CardBus-enabled.

Virtually all other Libretto features remain unchanged. The floppy disk drive is still outboard, hooking to the system via a

connected PC Card. The 80-key, 15-mm keyboard is still small and cramped, but it's marginally touch-typable. To connect anything to the base unit, you'll have to snap on the included port expander, with serial, parallel, video-out, and keyboard/mouse connectors. For further connections, there's the enhanced port replicator (\$440 street), which adds a USB connector and Type II and III PC Card slots.

Toshiba's Libretto 100CT is certainly not cheap; you can purchase a full-size notebook with more power for the same amount of money. But for the vendor's target audience, this tiny system may pay for itself through its convenience alone. **Toshiba Libretto 100CT.** Street price: \$2,500 with 166-MHz Pentium/MMX CPU, 32MB RAM, 2GB hard disk, port expander. Toshiba America Information Systems Inc., Irvine, CA; 888-598-7802; computers.toshiba.com. Choose 407 at www.pcmag.com/infolink

Where can Acer's powerhouse, single-battery notebook
with the new Pentium II processor take you? A lot further
than the competition. What else would you expect from the world's
3rd largest PC manufacturer?



If you are looking for power-to-go, you'll find it in the TravelMate[®]

7300. In fact,

it is one truly

revolutionary,

single-battery

Intel Pentium II

TravelMate 7364TE

- 266MHz Intel[®] Pentium[®] II processor
- 64MB SDRAM (upgradeable to 128MB)
- 4.1GB hard disk drive
- 13.3" (diagonal) XGA TFT display
- 20X (max.) hot-swappable modular CD-ROM
- DMI 2.0 compliant
- Windows[®] 95

notebook. Imagine having the performance plus enough mobile computing hours to actually get ahead in the productivity game. No wonder Acer is the world's 3rd largest PC manufacturer[®].



Acer Technology that

is redefining the term

upward mobility.

Call Acer at 1-800-733-ACER
& select option 2
www.acer.com/info/mobile/



*The Top 10 PC Manufacturers Worldwide List: A Verifiable Compilation, by IDC Consulting, November, 1997. ©1998 Acer America Corporation. Acer, the Acer logo, and TravelMate are registered trademarks of Acer America Corporation and Acer, Inc. Intel, the Intel Inside Logo, and Pentium are registered trademarks of Intel Corporation. Windows is a registered trademark of Microsoft Corporation. All other company and/or product names are the property of their respective trademark owners.

Choose 087 at www.pcmag.com/infolink

**MICROSOFT
WINDOWS NT
WORKSTATION**

*IN 1997, 1.3 MILLION WORKSTATIONS
WERE EQUIPPED WITH WINDOWS NT®
WORKSTATION.*

*WINDOWS NT® WORKSTATION SHIPMENTS
INCREASED MORE THAN 80%.*

UNIX

*IN 1997, 660,000 WORKSTATIONS
WERE EQUIPPED WITH UNIX.*

UNIX SHIPMENTS DECLINED 7%.



With Windows NT® Workstation on the rise, investing in a SUN workstation with UNIX may not be the best choice. Because you don't want to end up with a complicated system that may become outdated. Fortunately, you don't have to sacrifice functionality to stay current with the times. Every high-performance Dell® WorkStation is built to meet the demanding needs of 2D and 3D design, financial modeling, software development and over 100,000 WIN32 applications. And then there are all the standard benefits of owning a

NEW REPORT SUGGESTS IT'S WISE TO STAY AWAY FROM THE SUN.

Dell. Like custom configuration, next-business-day on-site[®] service and support, and lower prices. And with Windows NT Workstation, you may save even more, without the need to train or hire UNIX experts. The hassle of running two separate systems becomes a thing of the past, too. So, the decision is easy. Come rain or shine. To custom order your Dell WorkStation with Windows NT Workstation today, call 1-800-944-8079. Or visit our website at www.dell.com/products/workstat/go

DELL[®]
www.dell.com

Screen image courtesy of Autodesk, Inc. The Intel Inside logo and Pentium are registered trademarks and MMX is a trademark of Intel Corporation. Microsoft and Windows NT are registered trademarks of Microsoft Corp. Dell and the Dell logo are registered trademarks of the Dell Computer Corporation. ©1998 Dell Computer Corp. All rights reserved.

First Looks

BUSINESS MANAGEMENT SOFTWARE

Intranet in an Instant

Microsoft BackOffice Server 4.0 puts everything you need to build your corporate intranet in one box.

By Steve Rigney

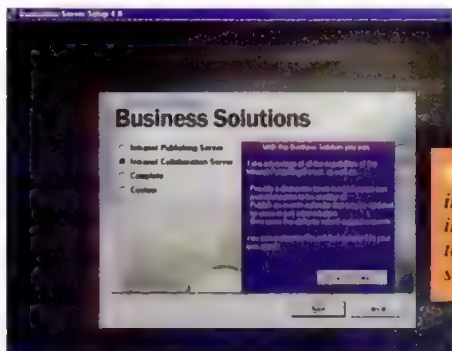
Your boss wants an intranet Web server to "build corporate identity." You know there's a lot more to putting corporate data online than loading up Web-server software. How do you pull together all the pieces of software to handle Web pages, database searches, discussions, Internet access, and security and still have some assurance that they'll all work together? Until recently, you were on your own and could only hope to purchase or download compatible software packages that provided the intended results.

Although some vendors (Netscape and Lotus, for example) offer bundled solutions for groupware and intranet applications, no single company gives you all the software tools you need to set up groupware, file, print, e-mail, intranet, Web, and application servers. Microsoft obviously saw this gap in the market, because BackOffice Server 4.0 includes all of these servers and more in a single bundled package. Although we appreciate the fact that you get all these different products in a single package, it's the integrated installation and management of the different products that we like best.

BUNDLED BARGAIN

The first thing your CFO will probably notice about BackOffice is the deep discount you get for buying the bundle. For example, a single copy of BackOffice with five client licenses will cost \$3,807 (list) compared to the \$9,734 you would have to pay if you bought all the appli-

cations separately. The BackOffice client licenses also drop in price as you purchase more, and they retail for about \$198 each for a quantity of up to 100.



On the whole, you can expect to save about 61 percent on the server components and around 64 percent on the licenses. Note that the license agreement requires that you install all of the BackOffice servers on a single PC. If you want to set up a dedicated server for Microsoft Exchange Server or Microsoft SQL Server, you'll have to purchase these products separately. This licensing condition limits the appeal of the package to medium-size or branch-office networks where a single server can carry the entire load.

The entire package has reasonable hardware requirements and will run on a Pentium/100 with 64MB of RAM and as little as 1GB of disk space. Nevertheless, we recommend a faster processor with at least 128MB of RAM and 3GB of disk space. Of course, Microsoft Windows NT can handle multiple proces-

sors. In our experience, Web serving is easy and database serving is difficult. If an active database is in your plan, consider using multiprocessor hardware or even adding a separate database server to carry that load independently.

WHAT'S THE SCENARIO?

If you've never set up an intranet or application server, it is hard to know about all of the software components you'll need. After the price, the integrated setup wizard is BackOffice's best selling

BackOffice includes a scenario-based installation that allows you to pick the type of intranet server you want to set up.

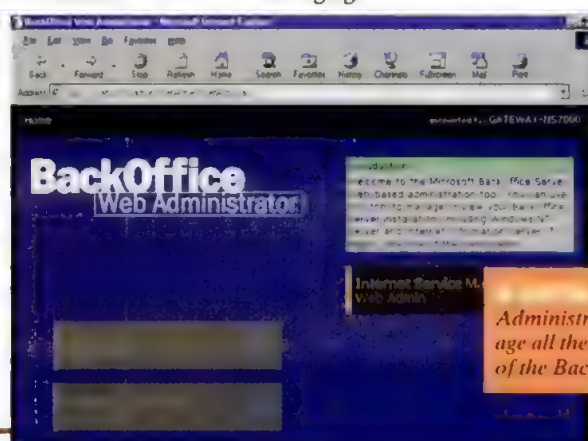
point. To help you set up a server for a specific set of tasks, Microsoft uses several scenario-based installations, which include all of the components you'll need for the type of server you want.

When we first launched the installation wizard, we were prompted to pick from two types of intranet servers: an intranet publishing and an intranet collaboration server. If you choose to set up an intranet publishing server, the wizard will install Microsoft's Windows NT, NT Option Pack, SQL Server, Proxy Server, SNA Server, and Internet Explorer. Likewise, the collaboration server choice will install the above components plus Exchange Server for messaging.

The scenario-based process also asks if you want to use a firewall or connect to an AS/400 or mainframe computer. Your answers to these questions will determine whether the wizard installs the bundled Proxy and SNA Server components. This question-based installation takes a lot of time and guesswork out of the process. If you don't know exactly what you want to do with the different components, you can perform a complete installation or simply run the setup program to add software later.

We also appreciate the inclusion of the bundled service packs for all of the individual components. Normally, you would have to spend hours online downloading the individual service packs needed for all of the applications in the package.

Although you can install BackOffice on a clean PC, we decided to use a real-world scenario and load it on a Windows NT server that already had a few components installed (namely Exchange and SQL Server). Not only did the BackOffice installation update all of our existing applications, it also kept our data intact without making any major changes. The single installation wizard asks only about 15 questions (compared to the approximately 50 you would have to answer if you installed the components separately). Nonetheless, you should still set aside about 4 to 5 hours to perform the task.



WHAT'S IN THERE?

BackOffice includes Windows NT Server 4.0, Exchange Server 5.5, Windows NT Option Pack, SNA 4.0, Proxy Server 2.0, IIS

The Web Administrator lets you manage all the major components of the BackOffice family.

4.0, SQL Server 6.5, FrontPage 98, SMS Server 1.2, Seagate Software Crystal Info 5.0, and a mail-in coupon for Site Server 3.0. Combined, these packages can perform almost any server-based task that most intranets will ever need. Although it is impossible to examine all of the included components in a single review, we can discuss the features of the major servers.

Clearly, the one component you must install is Windows NT Server (unless you already have it running on your server). Another important (albeit free) component you should probably set up is the Windows NT Option Pack. This

they were running. SMS also let us distribute software to all of the PCs on the network. SMS even includes a remote-control utility you can use to troubleshoot a PC across a network or dial-up connection.

Some of the high-end tools bundled with BackOffice include the SQL and SNA servers. The SQL database serv-

ager, news desk, events calendar, discussion forum, expense reports, and a help desk. These programs are ready to go to work with any Web browser and are automatically installed with the other components. You can input customizing information, such as corporate and user names, company logos, or other files that you want to use.

In addition to these applications, you can use BackOffice to create your own intranet solutions. All of the source code for the bundled programs is included. You can also use the

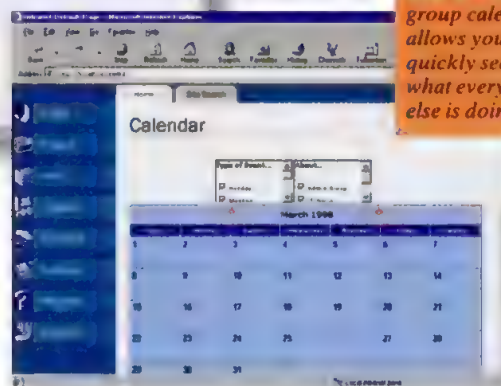
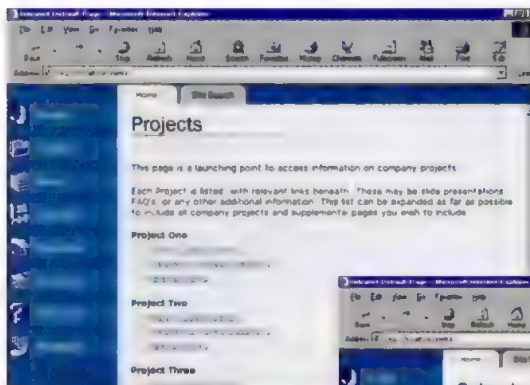
management to start, stop, or pause individual Windows NT services. This is a useful way to fix problems from a remote location. Our favorite feature of the management suite, however, was the ability to view the Windows NT Event logs.

To perform more in-depth tasks, you'll need to use the Microsoft Management Console (MMC). By itself, MMC is a basic reporting system that does not provide any configuration or management features. Windows NT Option Pack, Proxy Server, SNA Server, and Site Server 3.0, however, come with MMC "snap-in" administrative tools.

These snap-ins allow you to control and monitor almost every setting in the application. For example, you can use MMC to configure your Web server and even create Web pages and virtual Web servers. Though we acknowledge the ubiquity of browser-based management, we prefer the power of the MMC interface.

To be fair, BackOffice Server is not designed for large enterprise networks with thousands of users and dozens of servers. On a properly designed switched or segmented network, however, a single multiprocessor server running BackOffice can service the networking and intranet needs of hundreds of users. This Microsoft package provides an economical and simplified way to establish an effective corporate intranet in both small and medium-size offices.

BackOffice Server 4.0. List price: \$3,807 with five client licenses. Requires: 64MB RAM, 1GB hard disk space, Network Adapter. Microsoft Corp., Redmond, WA; 800-426-9400, 425-882-8080; www.microsoft.com. Choose 404 at www.pcmag.com/infolink.



You can use MMC to set up all of your server applications, including the Web and Proxy servers.

package, which anyone can download from Microsoft's Web site, includes Index Server, Certificate Server, Transaction Server, Message Queue Server, and a new improved version of Remote Access Service (RAS). All of these tools are necessary for setting up an intranet server or connecting your server to the Internet.

The second most popular component is Exchange, a combination messaging/groupware server. You can use it to send internal and external e-mail messages as well as set up group discussions. You can also keep track of each of your users and share files with your coworkers. (Exchange Server 5.5 was reviewed in "E-Mail Is the Key," March 10, 1998.)

Network administrators should get a lot of use out of the bundled System Management Server (SMS) toolkit. On our tests, we used SMS to create an inventory of our client PCs to see what hardware and software

er is a powerful tool for creating relational database applications. SQL is scalable enough to handle almost any size database, and with the built-in Internet Database Connector you can let users access information as HTML pages through a standard browser. Although we didn't test the SNA server for this review, we know how valuable it is if you have an AS/400 or mainframe that you want to connect to your LAN. The SNA server allows you to connect your Windows NT server directly to your legacy system and share data with your client PCs.

UP AND RUNNING

Now that you have all of the software components installed, you may find it daunting using them together or creating your own applications. To help you get started, Microsoft includes a set of seven intranet applications that you can use right out of the box. These canned applications include a projects folder, user man-

agement, news desk, events calendar, discussion forum, expense reports, and a help desk. These programs are ready to go to work with any Web browser and are automatically installed with the other components. You can input customizing information, such as corporate and user names, company logos, or other files that you want to use.

MANAGING BACKOFFICE

Another advantage to buying BackOffice versus purchasing the servers separately is the integrated management software. BackOffice provides both browser-based and Windows-based management utilities. We found that the browser-based management was good for remote monitoring, but we were limited in some of the tasks we could perform.

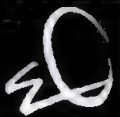
All of the browser-based management features work through Active Server Pages (ASPs). Each individual ASP page allows you to perform tasks such as adding users and configuring services. You can even use the Web

The group calendar allows you to quickly see what everyone else is doing.



©1998 Princeton Graphic Systems. All brand names, trademarks, and registered trademarks are the property of their respective owners.
As an Energy Star™ Partner, Princeton Graphic Systems has determined that this product meets Energy Star™ guidelines for energy efficiency.
Product features subject to improvement without notice.

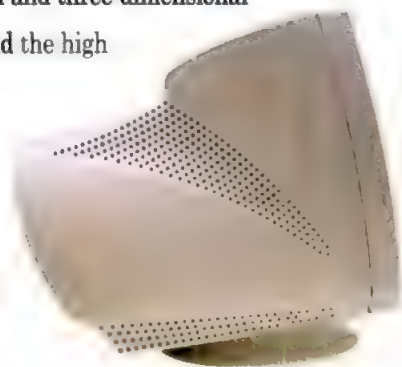
EO SERIES



improve your view of the world.

Introducing the EO710 17" (15.95" viewable) monitor from Princeton.

Princeton creates monitors that improve the way you work, as well as your view of the world. In fact, the more you demand, the more Princeton delivers. The EO710 is designed smart with a sleek, space-saving shell and plenty of features, including an Advanced High Contrast CRT for greater image definition and three-dimensional clarity. Our Ultra Fine Dot Pitch of .26mm produces a clear and crisp image. And the high maximum resolution of 1280x1024 (1024x768 at 85Hz recommended) provides outstanding flicker-free performance. There's even an Autosetup feature to make setup as easy as touching a button. The EO710 is TCO compliant and exceeds the most stringent emissions/safety standards. You can depend on Princeton with our full 3-year warranty on parts, labor and CRT, plus a 48-hour exchange program on all EO Series monitors. At Princeton our vision is clear; we've been making performance affordable for over 20 years.



You'll find Princeton's innovation in a full line of EO Series products.

Model	CRT	Viewable	Dot Pitch-Type	Max Res (H)	Max Refresh
EO500	15"	13.9"	0.28mm - High Contrast	1280	120Hz
EO710	17"	15.95"	0.26mm - High Contrast	1280	120Hz
EO720	17"	15.95"	0.26mm - MicroFilter™	1280	120Hz
EO90	19"	18.0"	0.26mm - High Contrast	1600	150Hz

PRINCETON®
Enhance your Image.

tel: 800.747.6249 ext: 180 • 714.751.8405 ext: 180
fax: 714.751.5736 web: www.prgr.com

The EO710 is the latest innovation in the award-winning Princeton product line.



First Looks

MULTIFUNCTION PERIPHERALS

Scan Across the LAN

HP's Network ScanJet 5 scans, copies, and faxes across a LAN, WAN, or the Internet.

By James Karney

It's a scanner, it's a fax, it's a copier—it's Hewlett-Packard's Network ScanJet 5 (Ethernet, \$2,999 list; Token Ring, \$3,199 list), able to send monochrome documents across a LAN or around the world. This 15-page-per-minute, 300-dpi device moves data using a local TCP/IP or IPX connection, the Internet, or HP's new JetSend technology.

HP's JetSend protocol lets two enabled machines negotiate the best method and speed to exchange files. With a supported e-mail gateway, the scanner can automatically forward a page to a local or Internet address as either a bitmap or PDF attachment.

The ScanJet 5 may look like a fax machine, but it's really a PC

with a scanner, CPU, hard disk, operating system, and network card. Hardware installation is easy, with intuitive setup menus. Bundled with Visioneer's PaperPort and Caere's OmniPage Lite OCR software, the ScanJet 5 can send to a local JetSend device as soon as it's connected.

Server setup was more complicated, and the documentation needs improvement. The scanner supports Novell NetWare, Microsoft Windows NT Domain, and IBM LAN Server environments for WAN or Internet operations. You'll need third-party fax-server software to reach a fax machine, however.

To test the ScanJet 5, we set up a Windows NT server with Windows 95 clients and a JetSend-en-

abled LaserJet 5000 printer (all running under TCP/IP) using three UTP hubs connected via thinnet. The domain server is equipped with an Exchange gateway for e-mail, and we were able to get ready access to the Internet by using Proxy Server. The scanner



reached its rated 15-ppm speed. Using the JetSend feature, the printer produced the first page in 35 seconds and the last in approximately 2 minutes.

Quality was what you would expect from a good office copier. Even with the fine and photo modes, images and gradient fills were worse than graphics-

scanner quality. Text, however, was clear and easy to read.

HP has done an excellent job with the client applications.

You can password-protect jobs, automate many tasks, and set up mailing lists.

The PagePort interface allows you to drag a job from its window and load it into Microsoft Word, for example.

Along with JetSend, the ScanJet 5's speed, ease of use, and software make it an attractive addition to any busy network.

HP Network ScanJet 5. List price: \$2,999 (Ethernet), \$3,199 (Token Ring). Hewlett-Packard Co., Santa Clara, CA; 800-243-9812, 408-246-4300; www.hp.com. Choose 406 at www.pcmag.com/infolink.

DIGITAL VIDEO

The Director's Cut

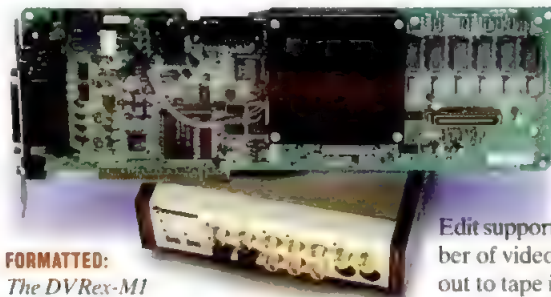
The DVRex-M1 is a complete audio and video editing package that lets you ignore AVI file-size limitations.

By Jan Ozer

Most videographers working with digital video need an editing solution to address traditional analog formats as well as a reliable mechanism for avoiding Windows' 2GB AVI file-size limitation. The DVRex-M1 (\$3,499 list), from Canopus, is not cheap, but it fits the bill on both counts, providing a good solution for developers who need to bridge the DV/analog-format gap.

The DVRex-M1 combines a PCI card and breakout box to input and output in both DV and analog (composite

and S-Video) video formats as well as DV and stereo analog audio. This lets developers mix source materials from DV and analog camcorders and output



FORMATTED:
The DVRex-M1 bridges the gap between DV and analog video.

the results to either format. Canopus includes three special-purpose programs (Rex Edit, Rex Video, and Rex Audio) and Ulead's MediaStudio 5.0.

You capture all DV and analog video from Rex Video, which offers frame-accurate machine control over your DV deck and such advanced features as batch capture. The DVRex transfers video from DV cameras over i.Link (1394) connections. It also converts all analog input to DV-format AVI files with an on-board hardware DV codec.

Most producers will use MediaStudio or other AVI editors to build their projects in 2GB chunks to be imported into Rex Edit for printing back to tape. Rex Edit supports an unlimited number of video files, reading them out to tape in real time to avoid the 2GB AVI file barrier. During our tests, we built a 20-minute video comprising both DV and captured Hi-8 footage, which we simultaneously printed to DV and Hi-8 decks.

Rex Edit can also render

multiple audio tracks in real time. All functions are aided by real-time preview if your video card fully supports DirectDraw overlay.

DVRex's MMX-enabled software codec rendered a 3-second dissolve in MediaStudio in about 68 seconds on a 233-MHz Pentium/MMX PC. Video quality was high, with no visible artifacts.

Avoiding the 2GB limitation by using plug-ins for editors is arguably more elegant than building your projects in 10-minute chunks. Nevertheless, DVRex's reliability surpasses any plug-in-based solution we've seen. To an editor on deadline, reliability just might be the most elegant feature of all.

DVRex-M1. List price: \$3,499. Requires: 32MB RAM, 2GB AV-rated hard disk, VGA card with hardware DirectDraw support, Microsoft Windows 95. Canopus Corp., San Jose, CA; 888-868-2533, 408-954-4500; www.canopuscorp.com. Choose 405 at www.pcmag.com/infolink.

Dell, Compaq, Gateway, Micron Electronics, HP, and IBM use **our** memory. **Now you can, too.**

FACTORY DIRECT PRICING

PC memory As low as

Dell 64 MB 32 MB 16 MB

Dimension \$118 \$64 \$44

OptiPlex \$118 \$64 \$44

Compaq 64 MB 32 MB 16 MB

Presario \$118 \$64 \$44

Deskpro \$118 \$64 \$44

Gateway 64 MB 32 MB 16 MB

G-Series \$118 \$64 \$44

E-Series \$174 \$64 \$39

GP-Series \$174 \$64 \$39

HP 64 MB 32 MB 16 MB

BRIO \$118 \$68 \$44

Kayak \$174 \$64 \$44

Pavillon \$118 \$64 \$44

Vectra \$118 \$64 \$44

IBM 64 MB 32 MB 16 MB

Activa \$118 \$64 \$44

Micron Electronics 64 MB 32 MB 16 MB

Millennia® \$118 \$64 \$44

Home MPC™ \$118 \$68 \$44

Client PRO® \$118 \$64 \$44

Powerstation™ \$118 \$68 \$44

Printer memory As low as

HP 16 MB 8 MB

LaserJet \$34 \$22

Lexmark 32 MB 16 MB 8 MB

Optra \$59 \$34 \$22

Prices are for 1GB memory. System configuration and other factors may affect pricing. Prices are subject to change without notice.

Call today for current prices.

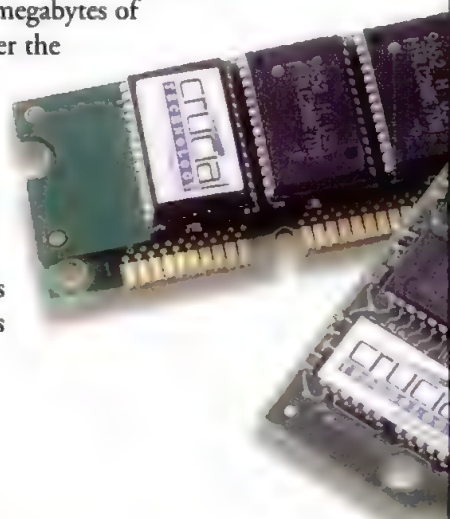
We make the memory that the best PC manufacturers install in their original systems. Now you can upgrade with the same, genuine memory that the major PC makers rely on.

Through Crucial Technology, you can buy memory upgrades direct from the factory of the largest memory manufacturer in the country — our parent company, Micron Technology.

Compaq, Dell, Gateway, HP, Micron Electronics, and IBM have installed more than 30 million megabytes of Micron RAM. They trust us to deliver the quality you demand. And now that you demand more speed and performance, but want the same reliability and compatibility, call Crucial Technology.

Not all RAM is created equal. There's a reason the major PC manufacturers depend on our memory.

Memory Is Crucial.™



Call us today at

1.888.363.3075

M-F 6AM - 8PM, SAT 8AM - 3PM, SUN 10AM - 2PM MST

Order anytime at

www.crucial.com

Crucial Technology
8455 Emerald Street
Boise, ID 83704
International Sales: 208.363.5911
Fax: 208.363.5501
Email: crucial.sales@micron.com
© 1998, Micron Technology, Inc.

crucial
TECHNOLOGY
A Division of Micron

WHEN CONSIDERING BE SURE TO READ

NEXT-BUSINESS-DAY AT-YOUR-DESK SERVICE GUARANTEE

If your Dell system experiences a covered hardware failure while it is under a guaranteed next-business-day on-site^A service contract purchased through Dell, and if a service request is forwarded to the third-party service provider before 5:00 PM local-customer time in the continental U.S., Monday through Friday, a technician, if needed, will arrive at your location to address the problem by the end of the next business day.[®]

GUARANTEED.

A SERVICE PROGRAM, THE GIGANTIC PRINT.

DELL DIMENSION® XPS D333 333MHz PENTIUM® II PROCESSOR FEATURING MMX™ TECHNOLOGY

- 128MB SDRAM Memory
- ★ **16.8GB Ultra ATA Hard Drive (9.5ms)**
- ★ **1200HS 19" (17.9" v.i.s., 26dp) Monitor**
- STB nVidia 4MB 3D AGP Video Card
- ★ **2X DVD-ROM Drive and Decoder Card**
- Turtle Beach Montego A3D Sound Card
- Altec Lansing ACS-495 Full Dolby Surround Sound Speakers with Subwoofer
- 56K Capable** U.S.R. x2 Modem
- Iomega Zip 100MB Internal Drive
- MS® Office 97 Small Business Edition plus Encarta 98; McAfee VirusScan
- MS Windows® 95/IE/IntelliMouse®
- ★ **FREE MS Windows 98 Upgrade Packet***
- Dell® Comfort Key Keyboard
- 3-Yr. Ltd. Warranty†/1-Yr. On-site^a Service

\$3499

Personal Lease^o: \$169/Mo., 24 Mos.^o
Order Code #500405

DELL DIMENSION XPS D333 333MHz PENTIUM II PROCESSOR FEATURING MMX TECHNOLOGY

- 128MB SDRAM Memory
- 8.4GB Ultra ATA Hard Drive (9.5ms)
- ★ **1200HS 19" (17.9" v.i.s., 26dp) Monitor**
- NEW Diamond Permedia 2 8MB 3D AGP Video Card
- 32X Max^o Variable CD-ROM Drive
- Turtle Beach Montego A3D Sound Card
- Altec Lansing ACS-495 Full Dolby Surround Sound Speakers with Subwoofer
- 56K Capable** U.S.R. x2 WinModem
- MS Home Essentials^o 98 with Money 98; McAfee VirusScan
- MS Windows 95/IE/IntelliMouse
- ★ **FREE MS Windows 98 Upgrade Packet***
- Dell QuietKey® Keyboard
- 3-Yr. Ltd. Warranty†/1-Yr. On-site^a Service

\$2899

Personal Lease^o: \$140/Mo., 24 Mos.
Order Code #500403



You may think all service programs are the same. But take a look at Dell's and one word jumps out: Guaranteed.

If there's a problem with your PC, a certified technician will be at your office or your home the next business day, servicing your PC.**

The Dell® limited warranty covers your Dell Dimension® system for three years.† We also offer one year of guaranteed next-business-day on-site^a service. And for only \$99, you can upgrade to a full three years of guaranteed next-business-day on-site^a service.

Call today to order a Dell Dimension PC. It comes protected by the Dell service program. And something else unique: a guarantee.

DELL®

TO ORDER TOLL-FREE

800-243-2696

TO ORDER ONLINE 24 HRS./DAY

www.dell.com/buydell

Mon-Fri 7am-11pm CT • Sat-Sun 8am-8pm CT

In Canada* call 800-233-0702

GSA Contract #GS-35F-4076D

Keycode # 04708

DELL DIMENSION XPS D300 300MHz PENTIUM II PROCESSOR FEATURING MMX TECHNOLOGY

- 64MB SDRAM Memory
- 6.4GB Ultra ATA Hard Drive (9.5ms)
- 1000TX 17" (15.9" v.i.s.) Trinitron® Monitor
- NEW Diamond 8MB 3D AGP Video Card
- 32X Max^o Variable CD-ROM Drive
- Integrated Yamaha Wavetable Sound
- Altec ACS-295 Speakers with Subwoofer
- 56K Capable** U.S.R. x2 WinModem
- Iomega Zip 100MB Internal Drive
- MS Office 97 Small Business Edition plus Encarta 98; McAfee VirusScan
- MS Windows 95/IE/IntelliMouse
- ★ **FREE MS Windows 98 Upgrade Packet***
- Dell QuietKey Keyboard
- 3-Yr. Ltd. Warranty†/1-Yr. On-site^a Service

\$2399

Personal Lease^o: \$117/Mo., 24 Mos.
Order Code #500406

DELL DIMENSION XPS D233 233MHz PENTIUM II PROCESSOR FEATURING MMX TECHNOLOGY

- 32MB SDRAM Memory
- 4.3GB Ultra ATA Hard Drive (9.5ms)
- 1000LS 17" (15.9" v.i.s.) Monitor
- STB nVidia 4MB 3D AGP Video Card
- 32X Max^o Variable CD-ROM Drive
- Integrated Yamaha Wavetable Sound
- Altec Lansing ACS-90 Speakers
- 56K Capable** U.S.R. x2 WinModem
- MS Home Essentials 98 with Money 98; McAfee VirusScan
- MS Windows 95/IE/IntelliMouse
- ★ **FREE MS Windows 98 Upgrade Packet***
- Dell Comfort Key Keyboard
- 3-Yr. Ltd. Warranty†/1-Yr. On-site^a Service
- ★ **Upgrade to 64MB SDRAM, add \$99.**

\$1799

Personal Lease^o: \$88/Mo., 24 Mos.
Order Code #500401

Reference the appropriate order code to receive featured configuration and pricing.

*Personal leasing arranged by Dell Financial Services L.P., an independent entity, to qualified customers. Amount of monthly lease payments above are based upon 24-month lease. All above monthly lease payments exclude taxes which may vary (for example, Hartford City, IN sales tax \$8.45/month); shipping cost due with first payment; no security deposit required; subject to credit approval and availability. Lease terms subject to change without notice.

Pricing is not discountable. †For a complete copy of Limited Warranties and Guarantees, please write Dell USA L.P., Attn: Warranties, One Dell Way, Round Rock, TX 78682. ‡On-site service guarantee provided pursuant to a service contract with a third-party provider. May not be available in certain remote areas. **The on-site service response guarantee applies to registered owners of Dell Dimension systems purchased after August 2, 1993. Please understand that this guarantee does not apply to service calls missed for reasons clearly outside of our control, such as interrupted telephone service, the closure of airports required for parts delivery or parts shortages. This guarantee applies to the continental U.S. and Canada only. This guarantee is subject to change without notice. *Each Dell Dimension XPS D series system with Windows 95 factory installed, shipped after 4/1/98 and prior to 9/1/98, will be eligible for a free upgrade to Microsoft Windows 98 when available, subject to terms and conditions contained in "Windows 98 upgrade packet" shipped with system. Length of offer subject to change. †32X Max/14X Min **x2 products are capable of 56Kbps downloads. Due to FCC rules that restrict power output, however, current download speeds are limited to 53Kbps. Upload speeds are limited to 33 Kbps. Actual speeds may vary depending on line conditions. *Process and specifications valid in the U.S. only and subject to change without notice. The Intel Inside logo and Pentium are registered trademarks and MMX is a trademark of Intel Corporation. MS, Microsoft, IntelliMouse and Windows are registered trademarks of Microsoft Corporation. Dell, the Dell logo, QuietKey and Dell Dimension are registered trademarks of Dell Computer Corp. ©1998 Dell Computer Corporation. All rights reserved.



First Looks

ILLUSTRATION SOFTWARE

Full-Motion Design

Macromedia brings more special effects and Web features to the latest version of FreeHand.

By Luisa Simone

In our last roundup of vector illustration packages ("The PC Palette," April 22, 1997), Macromedia FreeHand 7 won the Editors' Choice. The latest release—Version 8—solidifies its lead over other packages thanks to robust special effects and more Web-centric features.

FreeHand 8 (\$399 list) offers several new drawing tools, many of them more direct. The Freeform tool, for example, allows you to reshape curves by pushing and pulling an object's outline. Because there is no need to use bezier control handles, even beginners can modify vector drawings with confidence. In addition, transformation handles now appear around any double-clicked shape, allowing you to resize, rotate, and skew objects without having to switch tools.

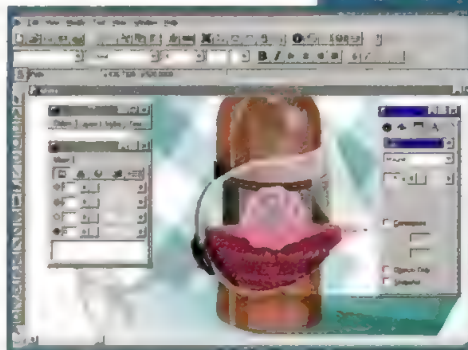
Much like CorelDraw, FreeHand now uses lenses to create different optical effects, including transparency, magnification, and color inversion. Well-thought-out details increase the utility of FreeHand's lenses. For example, you can move the center point of a magnification lens to any area of a drawing, making it a snap to produce enlarged insets like those found in technical diagrams or maps.

XTRA FEATURES

Most of the new features are implemented as Xtras. We still feel that using many separate palettes to access Xtras creates an unnecessarily cluttered workspace. Nevertheless, the tools themselves automate complex processes. For example, the Emboss operation produces five dif-

ferent relief effects, including such unusual variants as quilted or chiseled edges.

The new Graphic Hose is the first vector equivalent of the image sprayer. As you draw a line, the Graphic Hose inserts a series of images into your drawing. Creating a cluster of images—such as a bouquet of flowers or a flock of birds—has



HALF-FULL: FreeHand 8's magnification lens enlarges and displaces a portion of the underlying drawing to simulate the effect of looking through a glass.

never been easier.

It's revealing to compare FreeHand's new soft drop shadow with CorelDraw 8's new drop shadow effect. While Corel renders the drop shadow as a bitmap, FreeHand draws a series of blended vector objects. In our opinion, FreeHand does not achieve CorelDraw's level of photorealism, but it produces cleaner (artifact-free) PostScript output.

SERVICE BUREAU ON THE WEB

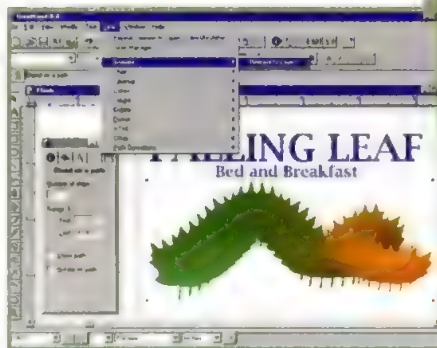
Graphic artists who still produce high-resolution print pieces will applaud two features, one new and one restored. Collect for Output gathers all of the relevant files (including fonts and externally stored bitmaps) into a folder for easy transfer to

a service bureau. And once again, you can use the tried-and-true screen-color matching system instead of Kodak's CMS.

Macromedia has established itself as a leading developer of Web graphics programs. FreeHand 8 surpasses both Adobe Illustrator and CorelDraw with its ability to generate Shockwave Flash animations directly.

At export time, you can convert the layers or pages in your drawing into sequential animation frames. The knockout punch is delivered by a simple command—Release to Layers—which can redistribute any blended object or selected text string across multiple layers. Pulsing color shifts, morphed shapes, and objects traveling along a path can all be recast as Flash animations in a matter of minutes.

During testing, we discovered that the current shipping version of FreeHand 8 has a serious communications problem with Microsoft Windows 95's print spooler, which makes it impossible to print. Installing a



You can quickly convert a blended object, such as this series of autumn leaves, into a Web animation by using FreeHand's new Release to Layers command and Flash Export options.

bitmap. Not surprisingly, both screen redraw and print performance are noticeably slower when a drawing contains new special effects. The drawing of a wine bottle and glass, for example, required over 20 minutes to print on a standard 600-dpi PostScript desktop device.

DESIGN IN MOTION SUITE

Anyone who plans to design for the Web should investigate the Design in Motion suite (\$499 list), which adds Macromedia Flash 2 and Insta.HTML. Flash 2 is the real value: It lets you create vector animations from scratch or optimize the animations created with FreeHand. This version can incorporate sounds, animate color transitions, and create fills from imported bitmaps.

Insta.HTML is a bare-bones Xtra that is suitable for generating HTML comps. Improvements to Insta.HTML include support for cascading style sheets and absolute positioning—features that help to preserve the layout of a FreeHand page. On our tests, Insta.HTML generated properly functioning URLs and correctly converted FreeHand graphics to Flash format, but it consistently produced poor GIF conversions.

FreeHand 8's new features make it easier to create sophisticated artwork, whether you are producing traditional print illustrations or generating Flash animations for the Web.

FreeHand 8. List price: \$399. Requires: 24MB RAM, 30MB hard disk space, Microsoft Windows 95 or NT 4.0 or later (with Service Pack 3). Macromedia Inc., San Francisco, CA; 800-288-4797, 415-252-2000; www.macromedia.com. Choose 403 at www.pcmag.com/infolink.

new DLL (which should be posted on the Macromedia Web site by the time you read this) solves the problem and produces perfect printouts.

FreeHand 8 offers improved performance on certain key operations, such as opening a file or displaying an imported

“

Dell and Gateway can only tell me about their

products. Mark, my account manager at **CDW**,

can **advise me**

on all the **leading brands,**

custom-configure them to my specifications,

”

and ship the **same** day.

IBM. Compaq. Toshiba. Microsoft. We're the leading seller of all of them in the direct marketing channel. Your CDW account manager is thoroughly trained in all those lines, and hundreds more, by the manufacturers themselves.

Even better, he knows your system too.

So he can help you compare, contrast, mix and match — even custom-configure a system of components from many manufacturers that will meet your precise needs. And you'll have it the next day, because we ship 97% of all orders the same day we receive them.

Call for your free CDW catalog today. Your first order will be delivered FREE!



**COMPUTER
DISCOUNT
WAREHOUSE**

**The right price.
The right advice.**

Call today! 800-785-4239

See our ad in the back

www.cdw.com

CDW®

New Extended Service Plan from CDW® provides more protection.

MINI-NOTEBOOKS

TOSHIBA Libretto 70CT

► 120MHz Intel Pentium® processor with MMX™ technology ► 16MB EDO DRAM standard ► 1.58GB hard drive ► 1.44MB external 3.5" floppy drive with PC Card connector ► 6.1" active-matrix display ► Sound Blaster® compatible sound ► Lithium ion battery ► Windows® 95 operating system ► 1-year parts and labor warranty

\$1687³⁶

CDW 100404

133MHz INTEL PENTIUM® MMX

TOSHIBA Satellite Pro 440CDX

► 133MHz Intel Pentium® processor with MMX™ technology ► 256KB Level 2 cache ► 16MB EDO RAM standard ► 1.34GB hard drive ► 10X CD-ROM drive ► 12.1" FastScan dual-scan display ► 8-bit color at 800 x 600 resolution ► Windows® 95 or Windows for Workgroups V3.11 operating system ► 3-year parts and 1-year labor warranty

\$1357⁰⁶

CDW 90351

COMPAQ Armada 1530DM

► 133MHz Intel Pentium® processor with MMX™ technology ► 256KB Level 2 cache ► 16MB EDO RAM standard ► 1.4GB hard drive ► 10X CD-ROM drive ► Integrated 33.6K bps data/fax modem ► 12.1" dual-scan display ► 8-bit color at 800 x 600 resolution ► Windows® 95 operating system ► 1-year worldwide limited warranty

\$1299⁰⁰

CDW 91507

COMPARE!

For the most extensive selection of PCs, click on CDW® Compare at <http://compare.cdw.com>



\$1737⁸⁶

CDW 100405

166MHz INTEL PENTIUM® MMX

TOSHIBA Satellite Pro 460CDX

► 166MHz Intel Pentium® processor with MMX™ technology ► 256KB Level 2 cache ► 32MB EDO RAM standard ► 2.02GB hard drive ► 10X CD-ROM drive ► 12.1" dual-scan display ► Windows® 95 operating system ► 3-year parts and 1-year labor warranty, 1-year battery

200MHz INTEL PENTIUM® MMX

COMPAQ Armada 7360DMT

► 200MHz Intel Pentium® processor with MMX™ technology ► 256KB Level 2 cache ► 32MB EDO RAM standard ► 3GB hard drive ► 33.6K bps modem ► 12.1" active-matrix display ► 32-bit CardBus and Zoomed Video support ► Windows® 95 operating system ► 3-year limited warranty

\$3427²³

CDW 101205



ThinkPad® 770

► 200MHz Intel Pentium® processor with MMX™ technology ► 512KB Level 2 cache ► 32MB SyncDRAM standard ► 3.2GB hard drive ► 13.3" XGA active-matrix display ► 16-bit color at 1024 x 768 resolution ► 32-bit CardBus and Zoomed Video support ► Windows® 95 operating system ► 3-year parts and labor warranty

\$3597⁶⁷

CDW 94545

150MHz INTEL PENTIUM® MMX



ThinkPad® 380D

► 150MHz Intel Pentium® processor with MMX™ technology ► 256KB Level 2 cache ► 16MB EDO RAM standard ► 2.1GB hard drive ► 8X CD-ROM drive ► 12.1" active-matrix display ► Windows® 95 operating system ► 1-year limited warranty

\$1998⁸⁷

CDW 86305

COMPAQ

Armada 7330T

► 150MHz Intel Pentium® processor with MMX™ technology ► 16MB RAM standard ► 2.1GB hard drive ► 12.1" active-matrix color display ► Windows® 95 operating system ► Lithium ion battery

\$1467³⁶

CDW 93735

233MHz INTEL PENTIUM® MMX



ThinkPad® 770

► 233MHz Intel Pentium® processor with MMX™ technology ► 512KB Level 2 cache ► 32MB SyncDRAM standard ► 5.1GB hard drive ► 14.1" active-matrix display ► 33.6K bps data/fax modem ► Windows® 95 operating system ► 3-year parts and labor warranty

\$4937⁸⁷

CDW 94547

266MHz INTEL PENTIUM® MMX

TOSHIBA Tecra 550CDT

► 266MHz Intel Pentium® processor with MMX™ technology ► 512KB Level 2 cache ► 3.82GB hard drive ► 20X CD-ROM drive ► 12.1" active-matrix display ► 56K bps (K56flex) modem ► 16-bit SoundBlaster Pro compatible sound ► Windows® 95 operating system

\$3847⁶³

CDW 105042

800-785-4239

©1996 CDW Computer Centers, Inc. 200 North Wacker Drive, Chicago, IL 60606 PC146666 3/2/96

**CDW is your
#1 direct
source for**

1. Toshiba
2. IBM
3. Compaq
4. Dell
5. HP

4 out of 5
of the industry's
top-selling brands!

Source: Computer Intelligence, 2H97 MarketModel update, 10/97
Data reflects U.S. market share based on portable computer units shipped.
Portables include laptops, notebooks and ultraportables, exclude handhelds.

**YOU CAN HAVE IT ALL
WITH CDW:**

Price Service Selection & More!

166MHz INTEL PENTIUM® MMX

COMPAQ

Deskpro 2000

▶ 166MHz Intel Pentium® processor with MMX™ technology ▶ 256KB Level 2 cache ▶ 16MB SDRAM standard ▶ 2.1GB EIDE hard drive ▶ Integrated S3/V2 enhanced 64-bit graphics ▶ Windows® 95 ▶ Intelligent Manageability ▶ 3-year limited warranty

\$798⁹⁷

CDW 92269

IBM Business Partner

IBM PC 300GL

▶ 166MHz Intel Pentium® processor with MMX™ technology ▶ 256KB Level 2 cache ▶ 16MB SDRAM standard ▶ 2.5GB EIDE hard drive ▶ Cirrus Logic 5446 graphics ▶ LANdesk client manager ▶ Windows® 95 ▶ 3-year limited warranty

\$838⁴⁷

CDW 89298

200MHz INTEL PENTIUM® MMX

COMPAQ

Deskpro 2000

▶ 200MHz Intel Pentium® processor with MMX™ technology ▶ 256KB Level 2 cache ▶ 16MB SDRAM standard ▶ 2.1GB EIDE hard drive ▶ Integrated S3/V2 enhanced 64-bit graphics ▶ Windows® 95 ▶ Intelligent Manageability ▶ 3-year limited warranty

\$867⁹⁷

CDW 92840

HP HEWLETT PACKARD Expanding Possibilities

HP Brio 8014 PC

▶ 200MHz Intel Pentium® processor with MMX™ technology ▶ 256KB Level 2 cache ▶ 16MB RAM standard ▶ 2.1GB EIDE hard drive ▶ S3 Trio64V2 graphics ▶ McAfee Virus Scan ▶ Windows® 95 ▶ Mini-tower case ▶ 3-year limited warranty

\$887⁵⁷

CDW 95052

233MHz INTEL PENTIUM® MMX

COMPAQ

Deskpro 2000

▶ 233MHz Intel Pentium® processor with MMX™ technology ▶ 256KB Level 2 cache ▶ 16MB SDRAM standard ▶ 2.1GB EIDE hard drive ▶ Integrated S3/V2 enhanced 64-bit graphics ▶ Windows® 95 ▶ Intelligent Manageability ▶ 3-year limited warranty

\$947⁷⁶

CDW 101306

HP HEWLETT PACKARD Expanding Possibilities

HP Vectra VE 4 PC

▶ 233MHz Intel Pentium® processor with MMX™ technology ▶ 256KB Level 2 cache ▶ 16MB SDRAM standard ▶ 2.1GB Ultra ATA hard drive ▶ Integrated Trio64 enhanced 64-bit graphics ▶ Two USB ports ▶ Windows® 95 ▶ 3-year limited warranty

\$1059⁶⁷

CDW 108935

*Monthly lease payments quoted are based on a 36 month lease. Rates are subject to change.
Call your CDW account manager for details.

233MHz INTEL PENTIUM® II

IBM Business Partner

IBM PC 300GL

▶ 233MHz Intel Pentium® II processor ▶ 512KB Level 2 cache ▶ 32MB SDRAM standard ▶ 2.5GB Ultra ATA hard drive ▶ 64-bit AGP graphics ▶ Wake on LAN™ enabled ▶ Windows® 95 ▶ 3-year limited warranty

\$1127⁵⁸

CDW 105863

COMPAQ

Deskpro 2000

▶ 233MHz Intel Pentium® II processor ▶ 256KB Level 2 cache ▶ 32MB SDRAM standard ▶ 2.1GB Ultra ATA hard drive ▶ 2MB SGRAM Matrox enhanced 64-bit graphics ▶ Intelligent Manageability ▶ Windows® NT Workstation V4.0 ▶ 3-year limited warranty

\$1275⁷⁸

CDW 95916

266MHz INTEL PENTIUM® II

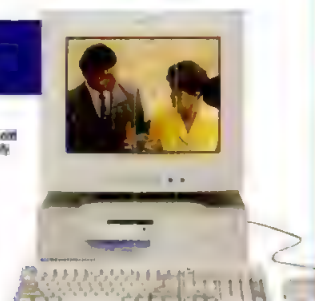
IBM Business Partner

IBM PC 300GL

▶ 266MHz Intel Pentium® II processor ▶ 512KB Level 2 cache ▶ 32MB SDRAM standard ▶ 2.5GB Ultra ATA hard drive ▶ 64-bit AGP graphics ▶ Wake on LAN™ enabled ▶ Windows® 95 ▶ 3-year limited warranty

\$1187⁵⁵

CDW 105864



300MHz INTEL PENTIUM® II

HP HEWLETT PACKARD Expanding Possibilities

HP Brio 8338 PC

▶ 300MHz Intel Pentium® II processor ▶ 512KB Level 2 cache ▶ 32MB EDO RAM standard ▶ 8GB EIDE hard drive ▶ 24X Max CD-ROM ▶ S3 Trio64V2 graphics ▶ Windows® 95 ▶ 3-year limited warranty

\$1875⁹⁷

CDW 107017

333MHz INTEL PENTIUM® II

COMPAQ

Deskpro 4000

▶ 333MHz Intel Pentium® II processor ▶ 512KB Level 2 cache ▶ 32MB SDRAM standard ▶ 3.2GB Ultra ATA hard drive ▶ 24X Max CD-ROM drive ▶ 2MB SGRAM Matrox enhanced 64-bit graphics ▶ Windows® NT Workstation V4.0 ▶ 3-year limited warranty

\$2249⁶⁸

CDW 105890

**CDW® PROVIDES
FREE CUSTOM
CONFIGURATION!**

CDW COMPUTER DISCOUNT WAREHOUSE

**The right price.
The right advice.**

800-785-4239

Become receptive to new ideas.

*Like capturing
ideas as fast as you
can write them down.*

*Like focusing
attention on the
meeting, and not
on taking notes.*

*Like printing notes
directly from the board.
No mouse clicks.
No keystrokes.*

*Like displaying
and editing ideas
in color.*

*Like using a new
technology without
changing the way
you work.*

*Like saving full-
color meeting notes
with team members via
email or the Internet.*

*Like saving accurate
meeting notes to your PC –
for everyone, automatically.*



Introducing the 3M[®] Ideaboard IB3000 Series. It's obviously useful and absolutely simple. For more information about 3M Advanced Meeting Solutions, call 1-800-952-4059 or visit www.3M.com/meetings

Make the meeting.

3M Innovation

First Looks

SPEECH-RECOGNITION SOFTWARE

Talking Back to the Web

Conversá Web uses speech recognition to give you hands-free Web surfing.

By Alfred Poor

If you were the type of kid who loved to terrorize your mother by tearing down the street on your bicycle and screaming, "Look!

No hands!", then you're going to love **Conversá Web** (\$29.95 download; \$39.95 CD-ROM), the first "no hands" Web browser. The product is most remarkable for what it doesn't have. There's no printed manual, because you'll already know how to use it; if there's a link on the screen, you just say it.

Conversa, unlike most speech-recognition programs, requires no mind-numbing training period. It uses a continuous-speech, speaker-independent

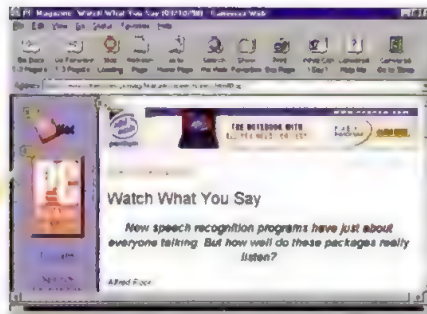
Conversá Web automatically finds all links on a page and assigns numbered "saycons" to bitmap and ambiguous links.

recognition engine, so it is ready to run as soon as it is installed. You can read any hypertext link on a page and **Conversá** will recognize it. In most cases, you don't even have to read all of the text.

If more than one link has the same text or if the link has no text at all, the program automatically identifies the links and assigns them a number. The number is displayed in a callout on the screen. **Conversá** has coined

the term "saycon" to refer to those icons that you can say.

The program features a toolbar with available spoken com-



mands, such as "Go Back" (where you can choose to go back from one to three pages). You can use the toolbar to get help, put the program to sleep, or add a site to your favorites list.

Conversá does not eliminate the keyboard and mouse completely, however. It doesn't have any dictation mode, so you'll have to type in URLs and search

terms when necessary.

The program requires Microsoft Internet Explorer 4.0 or later. The reason for this is that **Conversá** takes advantage of the IE open architecture and uses it as the underlying browser engine. You can still use IE on its own, or you can have any other browser installed as well.

With its amazing ease of installation and use, **Conversá Web** makes hands-free Web surfing even easier than hands-free bike riding—and maybe even more fun!

Conversá Web. Direct price: \$29.95 (download), \$39.95 (CD-ROM). Requires: 24MB RAM, 7MB hard disk space, Microsoft Internet Explorer 4.x, sound card, speakers, microphone, Microsoft Windows 95 or NT. Conversational Computing Corp., Redmond, WA; 888-487-4373, 303-683-6490; www.conversa.com. Choose 400 at www.pcmag.com/infolink.

INTERNET SOFTWARE

The Survey Says . . .

SurveySolutions provides the tools to conduct surveys over the Web and then analyze and present the results.

By David Haskin

You need good data before you can make good business decisions, and surveys are a time-honored way of acquiring such information. **SurveySolutions for the Web** (\$149 download; \$180 CD-ROM), from Perseus Development Corp., provides a complete set of tools for developing Web-based surveys and collecting, analyzing, and sharing the results.

The process begins with a wizard that asks what type of survey you want to create. You can select broad categories of questions, such as those related to demographics or product feature preferences. A questionnaire with dummy text then appears in **SurveySolutions'** built-in word processor. And since the program can save and import files in

RTF format, you can also use your own word processor.

SurveySolutions does a good job of simplifying the process for those with little survey experience. The user manual's ResearchExpert help system provides in-depth information about creating precise surveys. Nevertheless, **SurveySolutions** isn't as friendly to non-technical users. For instance, a wizard helps you finish your questionnaire, but it doesn't help you upload the survey to your Web server.

Surveys are returned to you via e-mail, which can clog your inbox. But if your server supports Microsoft FrontPage extensions,

you can store responses on your Web server and download them at your convenience. In either case, the built-in Mail Manager examines the results and automatically adds them to a Microsoft Access database table.

From the database table, you can create presentations that list

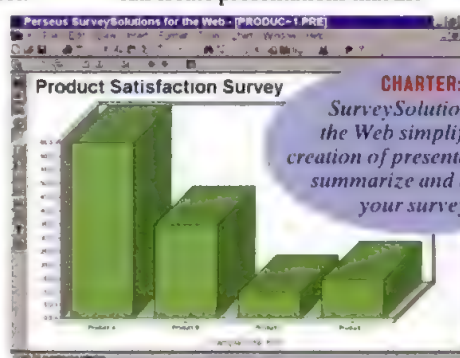
the tilt angle of 3-D pie charts.

After polishing the presentation, you can save it in a proprietary format or as an HTML file. But to use **SurveySolutions** charts in another presentation program, you must copy and paste them one at a time.

SurveySolutions' inability to import and export PowerPoint files and its lack of automation for posting surveys on the Web means it will be clumsy at times. Still, this product provides a comprehensive toolbox for gathering the type of information you need to make wise business choices.

SurveySolutions for the Web.

Direct price: \$149 (download), \$180 (CD-ROM). Requires: 4MB RAM, 7MB hard disk space, Microsoft Windows 3.1 or 95. Perseus Development Corp., Braintree, MA; 781-848-8100; fax: 781-848-1978; www.perseus.com. Choose 401 at www.pcmag.com/infolink.

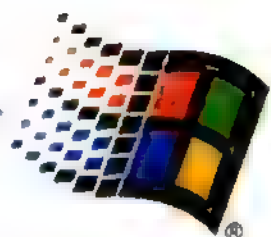


results and display charts and graphs. **SurveySolutions** doesn't try to replace your regular presentation program, but its charting skills are strong. It supports a wide variety of charts and graphs and extensive formatting options, such as the ability to adjust



*Windows 98 Upgrade offered via a mail-in coupon. \$4.95US/\$7.50CDN shipping and handling fee applies. Offer good in the US and Canada only. Must purchase a Handheld or Palm PC powered by the Windows CE 2.0 operating system between May 1 and June 30, 1998. 2.0 upgrades do not apply. To receive your copy of Windows 98 Upgrade, pick up the promotion mail-in coupon at your local reseller or print it off of our Web site at www.microsoft.com/windowsce/palmcc/. Please follow the mailing and proof of purchase instructions. Please allow 6 to 8 weeks for product delivery once available. © 1998 Microsoft Corporation. All rights reserved. Microsoft, ActiveSync, Windows, the Windows logo, and the Windows CE logo are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.

Limited Time Offer



Get Windows 98 Upgrade*

Now there's a new way to carry your most vital information with you anywhere—with Palm PCs powered by the **Microsoft® Windows® CE** operating system. Featuring a familiar interface, all designed for a small, lightweight package that lets you keep connected when you're on the go.

Put Windows in the palm of your hand— and get your hands on Windows 98 Upgrade!*

You'll like the way Palm PCs keep you effortlessly up-to-date. Because of **Microsoft ActiveSync™ technology**, your Palm PC files stay continuously and automatically in synch with your desktop PC. Just connect your Palm PC to your computer, and it does the rest, updating your contacts, calendar, tasks, e-mail and notes. And entering data is a cinch, whether you handwrite notes, or use the voice recorder or on-screen keyboard.

Whether your Windows-based world includes a network, a desktop PC, or a laptop, you'll want the palm-sized unit that best connects with it all. Look for the logo that says "Powered by Microsoft Windows CE" to ensure secure access to every Windows-based device.



When you purchase a Palm PC powered by Windows CE between May 1 and June 30, 1998, you are eligible to receive a coupon worth approximately \$109 to get Windows 98 Upgrade when available*. Please see your local reseller for details. For more information about the companies that provide Palm PCs powered by Microsoft Windows CE, go to www.microsoft.com/windowsce/palmpc/.

First Looks

MOBILE COMPUTING

Strut Your CPU

The Xybernaut 133P is ready for wearable, hands-free computing.

By Bruce Brown

The first time you see someone using a Xybernaut system (particularly if you're not in a military or high-tech inspection environment), you may wonder if you've walked onto the set of a thriller or spy flick. The Xybernaut 133P's head-mounted display resembles the hands-free night-vision scopes used to great effect in the movies. But in reality, this portable, lightweight Windows 95 system has myriad applications, most of which are far removed from the fantasy of movie sets.

HANDS-FREE COMPUTING

The Xybernaut is aimed at users who must access large volumes of technical data without turning away from tasks or using their hands. Typical uses for the unit include aircraft maintenance, technical and logistical data access during complex loading operations, and field surveying. Other uses include inspection, data collection, surveillance, and training.

Using Verbex Listen for Windows 95, the bundled speaker-independent command-and-control program, a Xybernaut user can consult information stored on the hard disk or held at a central facility reached via an RF-LAN card or a wireless modem (the modem, which is not included, can be plugged into one of the two CardBus PC Card slots). A small, one-inch-diagonal LCD can swivel to either side of the helmet and give a 32-degree view of a 256-monochrome-shade 640-by-480 screen. You can also plug in an external monitor and keyboard; for appropriate applications, the unit supports simultaneous monitor and headset displays. A 115-

Kbps infrared port is also integrated.

Based on a 133-MHz Pentium CPU with 32MB of RAM and 256K L2 cache (but without a hard disk or headset, which means no display or voice-activation headset), the Xybernaut sells for \$6,495 (list). Add a 1.3GB hard disk (\$460 if purchased at the same time as the base unit) plus the Xybernaut Head Mounted Display with Microphone and Earphone (\$1,500 as part of the bundle) and the full system price rises to \$8,455. More memory, a larger hard disk, and other options are available, though each is costly. Extra batteries, for instance, cost \$600.

STRAP IT ON

The full system, including the CPU, a lithium-ion battery pack rated for 4 to 6 hours of continuous use (recharging takes 2 to 3 hours), a headset, a belt to hold it all, and an optional wrist-mounted minikeyboard (\$469) weighs a comfortable 6 pounds 4 ounces. The adjustable belt has a wrap-

around horizontal Velcro closure on the back to contain the cables and minimize the chances of them catching on furniture or other articles.

Once the battery, which has a power-level indicator, is charged, you can easily attach it to the Xybernaut's belt along with the CPU. The headset can be adjusted, and the swing-down display module swivels to either side (as does the noise-canceling microphone assembly). The display's brightness can be adjusted, and there is even a focus ring on the part closest to your eye.



ROAD WARRIOR: You can control the Xybernaut 133P with the pointing device, your voice, or the minikeyboard.

During testing, the display was relatively easy to view indoors, but like most LCD screens it was more difficult to see in daylight. Two of our testers, one with uncorrected vision and another with only minor nearsightedness, found it relatively easy to adjust the display for clear focus. A third tester with highly corrected vision was not able to use the display successfully.

It's hard to believe that the Xybernaut's tiny screen would be usable during an acclimation period, but the two testers who were able to see the display found that their eyes (and brains) accommodated to the screen size within 10 to 20 min-

utes. Also, they were able to read it almost as clearly as a conventional-size display.

You can control the Xybernaut using the keyboard, the pointing device, or your voice. The miniature keyboard, which is strapped onto a lower arm, is the most conventional input device, coupled with a small joystick with two buttons mounted on the CPU. With a little practice, we found it easy to move the joystick accurately.

TALK TO ME

For voice control and audible response, the headset has a single earpiece and a microphone on a flexible boom. Unlike the flimsy booms that are found on inexpensive headsets, the Xybernaut's boom held the microphone in place.

Verbex Listen for Windows

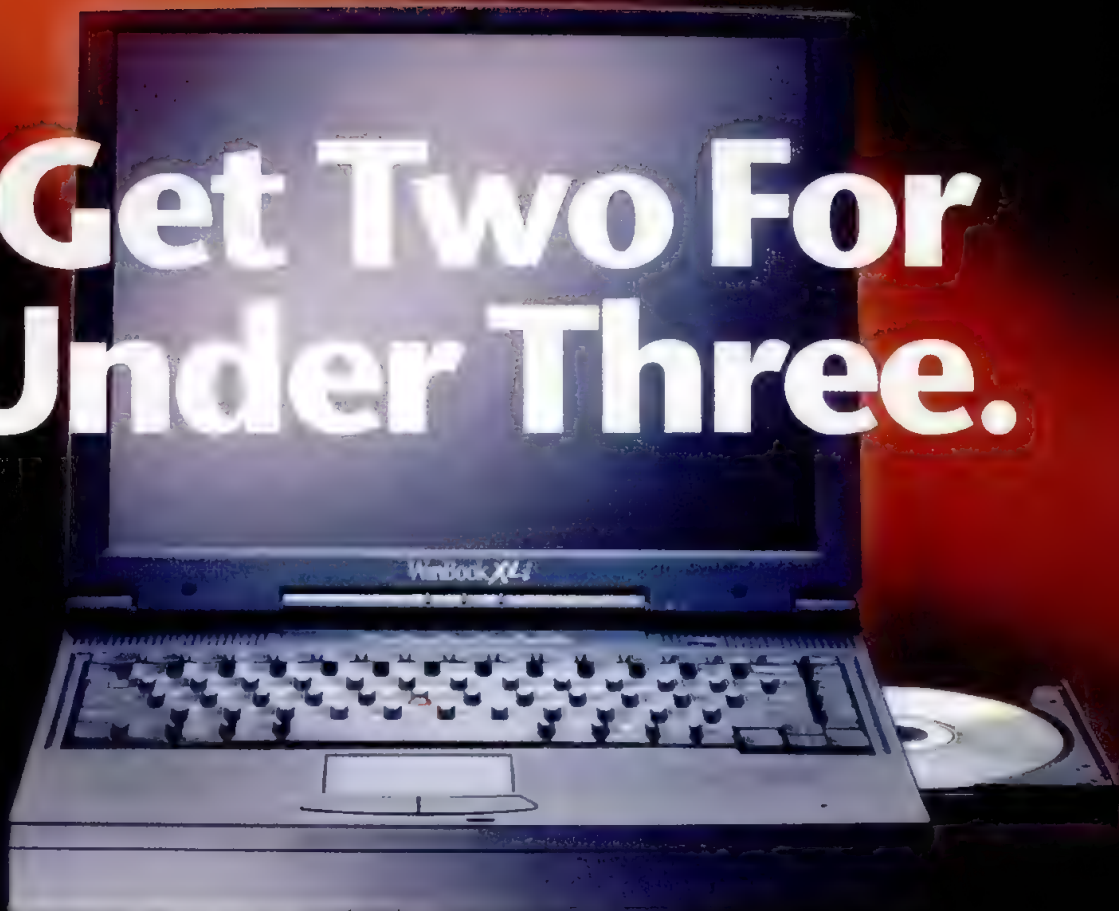
95 can respond to continuous phrases. Verbex, which is designed for North American voices (but can be retrained to respond to any accent or language), supports more than 20,000 commands for common languages and includes the ability to add commands.

During testing, Verbex responded both quickly and accurately.

The Xybernaut 133P's pricing (as well as its unconventional I/O) puts it beyond the budget or needs of most business operations. But the combination of relatively high-powered and exceedingly portable computing gives this futuristic technology plenty of real-world applications.

Xybernaut 133P. List price: \$8,455 (includes CPU with hard disk and Head Mounted Display with Microphone and Earphone). Xybernaut Corp., Fairfax, VA; 888-992-3777, 703-631-6925; www.xybernaut.com. Choose 402 at www.pcmag.com/infolink.

Get Two For Under Three.



Pentium® II Processor Power at less than \$3000.

266 MHz Intel® Pentium® II Processor (Intel Mobile Module)

- 13.3" XGA Active Matrix Color Display
- 32 MB SDRAM, expandable to 128MB
- 3-D Graphics Acceleration w/ 4 MB SGRAM
- 4.0 GB Ultra DMA removable Hard Drive
- 45-Watt/hour Lithium Ion Smart Battery
- 512k Pipeline Burst L2 Cache
- 3.5" Floppy Drive and 20x Max Variable Speed CD-ROM **both built-in, no need to swap**
- Integrated Dual-Button **Pointing Stick and Touchpad**, both active simultaneously
- 16-Bit Stereo Audio
- Two Type II or one Type III PCMCIA Slot, CardBus and ZoomedVideo supported
- Parallel, Serial, PS/2, VGA, 2-way Infrared port, TV out, USB (2), DVD-Ready
- Kensington lock support plus retractable tie-down attachment
- One-year extendable warranty
- Microsoft Windows® 95 pre-installed

266 MHz
Pentium® II
Processor **\$2999**

- Upgrade to 64/128 MB SDRAM
- Upgrade to 56k Internal Modem
- Upgrade to 5 GB Hard Drive

Winner of over 140 industry awards

266 MHz, 13.3" TFT, 4 GB HD, 3-D



With speed gains up to 50% in floating point calculations and a big boost in MMX enhanced functions, the introduction of the new mobile Intel® Pentium® II Processor is a big leap forward for portable computing.

Even better news is that WinBook is offering this exciting new technology at a great low price. Our new XLi model is packed with high-end features like 32 MB of fast SDRAM, a 4 GB Ultra DMA hard drive, 4 MB of SGRAM for 3-D acceleration and more.

Combine all of that with our award-winning reputation and it's a package that's hard to resist. Call today or visit us at www.winbook.com.

Mon-Fri 8am-9pm EST Sat 9am-4pm EST

U.S. sales only. 30-day unconditional money-back guarantee from date of purchase.

1-888-480-4571 www.winbook.com

WinBook

Critically Proven.

©1998 WinBook Computer Corporation. All rights reserved. WinBook is a registered trademark of Micro Electronics, Inc. The Intel Inside logo and Pentium are registered trademarks and MMX is a trademark of the Intel Corporation. All other trademarks and registered trademarks are property of their respective corporations. All prices and specifications are subject to change without notice or obligation. Prices do not include shipping.

Choose 085 at www.pcmag.com/infolink

All the Advantages of Mail Order Plus 1000 Times More Service and Support!



PREMIO® offers you all the guarantees of a manufacturer with competitive pricing, custom-configurations and a dedicated in-house customer support team. What we also offer that mail order won't give you is 7 regional offices and more than 1,000 resellers across the nation who are right there when you need them. Our ISO-9002 certified production facility ensures all PREMIO® systems and workstations are of the highest quality and are cross-platform compatible with Windows NT™, Windows 95™, NetWare®4.x and SCO® UNIX. All our products are also NetWare®YES certified and 3Com Network Ready™ to fit into any kind of network, anywhere. To know more about PREMIO® and to request for a product price quote, log on to our web site at www.premiopc.com or call us at 800-677-6477

Net
perfect

PREMIO® Series:
Featuring the
300MHz Intel
Pentium® II processor
for blazing MMX™
technology
PREMIO® 2120 with
internal w/ 1GB
with SCSI
memory
Maximum Digital
with 16MB w/ Ultra
CD-ROM
Maximum Performance
with 4MB w/ RAM
Optimized for 32-bit
environments and
Windows NT™
Software: MS certi-
fied, SCO® Unix com-
patible, IBM enabled
3Com Network
Ready™ certified
3 year warranty with
optional on-site
service
Full free technical
support
EISA and CMAA approved
Manufactured in
ISO 9002 Certified
Facilities



PREMIO® is the only PC manufacturer
to offer a 3 year warranty on the
entire system. The only manufacturer
to offer a 3 year warranty on the
entire system. The only manufacturer
to offer a 3 year warranty on the
entire system. The only manufacturer
to offer a 3 year warranty on the
entire system.

800-677-6477

www.premiopc.com/pcmag

See Us At FOSE Booth #1158
Spring Comdex Booth # 8443 • PC Expo Booth #3280
Choose 173 at www.pcmag.com/infolink

Second Looks

COREL WORDPERFECT SUITE 8

The Perfect Update

By Nancy Hirsch

We had few complaints to register about Corel WordPerfect Suite 8 when we first reviewed it ("Closer to Perfection?", September 23, 1997). Since that time, however, the vendor has produced a laundry list of improvements in its first update to the package: Service Pack 3. Some of the more useful features in Service Pack 3 include smoother conversion of Microsoft Word and Excel documents, augmented CorelCentral features, and the ability to synchronize data with your PalmPilot. Service Pack 3 is available for free from Corel's Web site (www.corel.com/support), or you can call Corel directly (800-722-6735) to order a CD-ROM version.

Bettering interoffice suite

With the new update to Corel WordPerfect Suite 8, you can open Microsoft Word documents right into WordPerfect.

compatibility. Service Pack 3 offers enhanced Microsoft Office 97 import and export filters. The program can now open documents created in the latest versions of Word and Excel directly into WordPerfect and Quattro Pro. Corel has also improved Unicode support, giving you the ability to import and export Unicode files as well as cut and paste Unicode characters.

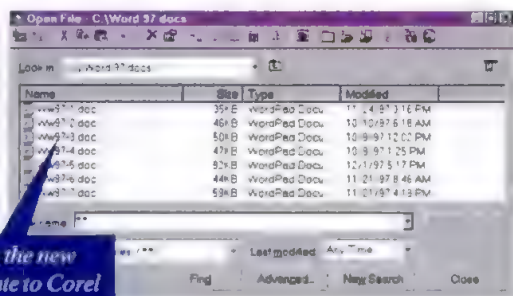
Service Pack 3 includes many enhancements and fixes to CorelCentral—Corel's application-bridging PIM—including better performance with address-book

and import filters, a global find feature (which lets you search for information across CorelCentral), and the option to choose other e-mail programs from the Send To menu.

PalmPilot users will be happy to learn that the CD-ROM version of the Service Pack (the vendor is working on posting it to the Web site) includes a

3Com-certified update to CorelCentral. With this update, you can synchronize your PalmPilot data with your desktop.

If you are not yet using Version 8, now is the time to upgrade, given the fact that Corel has just lowered the price to \$89 (list) from \$179. And since you can now use Dragon NaturallySpeaking to dictate directly into WordPerfect, Corel has bundled the voice-recognition software with upgrades (\$129 list) and full copies (\$425 list) of WordPerfect Suite 8.



VIAVOICE GOLD, DRAGON NATURALLYSPEAKING

Improve Your Speech

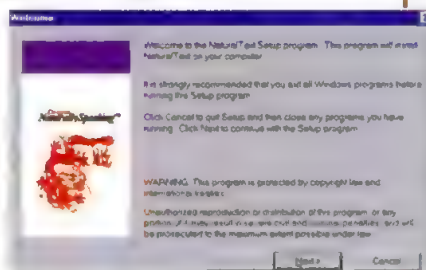
By Carol Venezia

Since we reviewed both IBM ViaVoice Gold 4.3 ("ViaVoice Takes Orders," March 24, 1998) and Dragon NaturallySpeaking Preferred Edition 2.0 ("Watch What You Say," March 10, 1998), both vendors have released updates to their products that fix problems and improve ease of use.

Late in the testing stages, IBM discovered a problem with the U.S. English version (Version 4.3.0.0) of ViaVoice Gold. When you used the Create button to create additional user IDs or the New button in the Enrollment Panel, a loss of user data would result. To fix this problem, IBM has posted a patch on its Web site (www.ibm.com/viavoice). This patch prevents loss of data when you use the above-mentioned functions.

In our roundup of speech-recognition programs, we tested Version 2.0 of Dragon NaturallySpeaking Preferred Edition. Since that story, Dragon has updated the program to Version 2.02, which is downloadable from

the vendor's Web site (www.naturalspeech.com). Unlike Version 2.0, Version 2.02 allows you to dictate into any 32-bit Windows application.



Also since our roundup, Dragon has made available as a free download Dragon NaturalWord, which lets you use NaturallySpeaking to dictate into Microsoft Word 97 (note that you must have Version 2.02 of NaturallySpeaking installed first). The beauty of this add-on is that it lets you edit and correct your work through speech, whereas the 2.02 update, as well as the NaturalText add-on (downloadable from Dragon's Web site), allow straight dictation but no command and control features.

SECOND LOOKS MAILBOX: Tell Second Looks about your experiences with computer products. Contact Carol Venezia at cvenezia@zd.com.

VISIONEER PAPERPORT 6000

Turn Out the Lights

By Nancy Hirsch

When we chose the Visioneer PaperPort 6000 as the Editors' Choice in our First Looks roundup of value-priced flatbed scanners ("Value-Minded Flatbeds," November 4, 1997), we liked its ease of use and software integration. Now Visioneer has posted two updated drivers to its Web site (www.visioneer.com), which makes this scanner an even better bet.

Even though the PaperPort 6000 doesn't have an on/off switch (all but one of the scanners in our roundup lacked this

feature), the newest Microsoft Windows 95 driver might be able to add some life to the scanner's lamp. If you forget to shut down the scanner, the driver will automatically turn off the lamp when Windows shuts down.

Visioneer has broadened the PaperPort 6000's appeal by adding a Windows NT driver, giving users of Windows NT the opportunity to use this Editors' Choice-winning scanner. Whether you're a Windows 95 or NT user, there's a new driver on the Visioneer Web site worth downloading.

It's not a box.

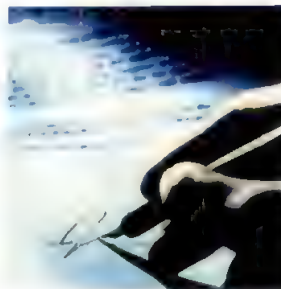
It's a door.



©1998 NEC Computer Systems Corporation. NEC and Beowulf are trademarks of NEC Corporation. UltraCare is a service mark of NEC Corporation. Windows and Windows NT are registered trademarks of Microsoft Corporation. MMX and ExpressMMX are trademarks, and UltraCare is a service mark of NEC Corporation. Pentium and Pentium II are registered trademarks of Intel Corporation. All other trademarks are property of their respective owners. *Maximum download speeds are limited to 56Kbps. Actual speeds may vary. Downloads travel at speed up to 28 Kbps. **Base model 5060 weighs 4.9 lb. Other models may vary in weight. 30-day money-back policy does not include return freight or original shipping and handling charges. †24-hour service during business days with the exception of remote locations.

Today, NEC invites you to access the resources of a nearly \$40 billion industry leader and enter into a whole new relationship with technology.

- > Enter into an ongoing membership to technology, instead of a one-time purchase.
- > Enter into a working partnership with a System Consultant dedicated to your business.
- > Enter into a virtually risk-free ownership with programs like 24-hour replacement insurance on Versa notebooks*, 30-day money-back guarantees, and on-site service warranties.
- > Enter into a place where technology comes to you first, with an insider's preview of new products and innovations.



◀ A door to obsolescence protection, thanks to business leasing with terms that adjust to your needs.

The UltraCare™ Card: ▶
A door to improved software support by experts who provide round-the-clock application and operating system solutions, quickly and effectively.
Call to order.



Our most powerful notebooks are also the ultimate desktop replacements, thanks to their VersaBay flexible docking solutions and accessory options.

Versa 6260

- 266MHz Pentium® processor with MMX™ technology
- 13.3" XGA Active-Matrix TFT Color Display
- 32MB EDO DRAM (128MB Maximum)
- 512KB L2 Pipeline Burst Cache
- 3.0GB Hard Drive
- Lithium Ion Battery
- Modular VersaBay™ II Accepts VST™ Zip100 Drive, 20X Maximum Variable-Speed CD-ROM Drive, 1.44MB Diskette Drive (all included) or Optional 2nd Lithium Ion Battery or SuperDisk™ 120MB Drive
- PCI Bus Architecture with NeoMagic™ 128-Bit Graphics Accelerator
- Integrated 16-Bit Stereo Sound
- 32-Bit CardBus and Zoomed Video Support
- USB, 4Mbps Fast Infrared, and NTSC/PAL-TV Ports
- Microsoft® Windows® 95
- Full Docking Capability
- Upgrades:**
 - > MiniDock™ 6000, add \$499
 - > 2nd Lithium Ion Battery, add \$189
 - > Microsoft Windows NT® Workstation 4.0, add \$99
 - > VersaPro™ Ballistic Nylon Carrying Case, add \$89

\$4399

Lease From: \$156/mo. Code #V6272



The compromise between weight and features is over. The screen is large, the processor is fast, the profile is thin, the weight is light, and the price is affordable.

Versa 5080X

- 233MHz Pentium processor with MMX technology
- 13.3" XGA Active-Matrix TFT Color Display
- 32MB EDO DRAM (144MB Maximum)
- 512KB L2 Pipeline Burst Cache
- 2.1GB Hard Drive
- Lithium Ion Battery
- SuperDisk 120MB Drive Pak for UltraSlim™ VersaBay
- Modular UltraSlim VersaBay with NoStop Swap™ Technology Accepts SuperDisk 120MB Drive, 20X Maximum Variable-Speed CD-ROM Drive, 1.44MB Diskette Drive, and Weight-Saving Module (all included)
- PCI Bus Architecture with NeoMagic 128-Bit Graphics Accelerator
- Integrated 16-Bit Stereo Sound
- 32-Bit CardBus and Zoomed Video Support
- USB and 4Mbps Fast Infrared Ports
- Microsoft Windows 95
- 5 Pounds** and 1.5" Thin
- Upgrades:**
 - > Upgrade to 80MB RAM, add \$399
 - > PortBar™ 5000 with Ethernet, add \$249
 - > U.S. Robotics™ x2™ 56Kbps Modem, add \$159
 - > VersaPro Ballistic Nylon Carrying Case, add \$89

\$3499

Lease From: \$129/mo. Code #V5086



NEC PowerMate systems offer the superior compatibility and desktop manageability to lower the cost of ownership across your enterprise.

PowerMate Enterprise 8000-266

- 266MHz Pentium II processor
- 32MB SDRAM
- 32GB Ultra DMA 33 EIDE Hard Drive
- 32X Maximum Variable-Speed CD-ROM Drive
- 3.5" Diskette Drive
- Onboard Intel PRO/100 Fast Ethernet with Wake-On LAN Support
- Integrated 16-Bit SoundBlaster® Compatible Audio
- 1 Universal Serial Bus (USB) Port
- NEC MagicEye™ Technology
- Intel LANdesk™ Client Manager
- ATI XPERT@Work™ AGP, 4MB SGRAM Graphics Card
- IntelliCase Minitor Chassis
- Keyboard and Microsoft Mouse
- 3-Year UltraCare Limited Warranty with 1-Year On-Site Service

Upgrades:

- > Upgrade to 64MB SDRAM, add \$99
- > Upgrade to 4.3GB Ultra DMA 33 EIDE Hard Drive, add \$50
- > Upgrade to Microsoft Windows NT Workstation 4.0, add \$90
- > NEC C700™ 17" Monitor (16" viewable, 27dp), add \$449

\$1499

Lease From: \$55/mo. Code #P800772



The newest generation Pentium II processor-based server for growing workgroups and small businesses.

Express5800™ LS2400 Server

- Dual-capable 350 or 400MHz Pentium II processors
- 512KB L2 Cache with ECC
- Up to 1GB ECC SDRAM
- Integrated Dual-Channel Ultra Wide SCSI Controller
- Integrated Dual-Channel EIDE Controller
- 4 x 1" or 5 x 1.6" Disk Drive Bays for up to 36GB Capacity
- 5 Expansion Slots: 3 PCI, 1 ISA, 1 Shared
- 24X Maximum Variable-Speed CD-ROM Drive, 1.44MB Diskette Drive
- Integrated 10/100 Ethernet Controller
- ESMPRO™ Server Management Suite
- ExpressBuilder™ Installation Software
- 3-Year On-Site Service Warranty
- In-Chassis RAID Option
- Certified for Microsoft Windows NT and Novell® NetWare®

\$3999

Minimum Lease Available

Fully configured servers starting at:

Call now to order your customized PC.

1-888-863-2669

www.necnow.com

Mon-Fri 8am-8pm EST

Dept. No. PM785A

<enter here>

NEC

Technology is a race. Presenting the Official Pace Car.



©1998 NEC Computer Systems Division, Packard Bell NEC, Inc. NEC, Versa, and MultiSync are registered trademarks; VersaBay, ESMPRO, and Express5800 are trademarks, and UltraCase is a service mark of NEC Corporation, all used under license. Direction and MagicEye are trademarks and NEC NOW and <center here> are service marks of Packard Bell NEC, Inc. Leasing based on typical 36-month lease with purchase option. Other lease options may be available. Leasing arranged by third party leasing company to qualified customers. Prices do not include shipping or applicable sales tax, are valid in the U.S. only, and are subject to change without notice. Products and specifications are subject to change without notice. Microsoft, Windows, and Windows NT are registered trademarks of Microsoft Corporation. The Intel Inside logo, LANDesk, and Pentium are registered trademarks and MMX is a trademark of Intel Corporation. Hewlett-Packard is a registered trademark of Hewlett-Packard Company. All other trademarks are property of their respective owners. *Maximum download speeds are limited to 53Kbps. Actual speeds may vary. Uploads travel at speeds up to 28.8Kbps. U.S. Robotics x2 modems require x2-compatible analog phone line and x2-capable service provider. See www.usccom/x2 for details. 30-day money-back policy does not include return freight or original shipping/handling charges. Microsoft Windows 98 coupon offer is good only in the U.S. and Canada and for purchases of NEC computers configured by NEC with Microsoft Windows 95. PC must be sold on or after 4/1/98 and prior to 9/30/98 to be eligible for this offer. Coupons expire 10/31/98. See coupon which comes with shipment for details. NEC reserves the right to change the terms of this offer without notice. This offer is subject to product availability.

Introducing the 400MHz NEC Direction™ PC.

How committed are we to the highest performance and speed? The day Intel released their new 400MHz Pentium® II processor, we unleashed it in a powerful new Direction PC. This features the highest-performance Intel processor on the market. Thanks to new system architecture, this new 400MHz chip boasts a 20% speed gain over the previous 333MHz. Setting new benchmarks in multimedia and 3-D graphics performance. And just so you know, this Direction PC optimizes the new processor in a way that nobody else's can. It offers the first available 100MHz system memory bus, for even faster applications, graphics, and video performance. And with names like Intel, Microsoft, U.S. Robotics, Iomega, 3Com, and Diamond MultiMedia, the Direction components read like a who's who of high performance.



UltraCare™ Services:
Comprehensive warranties,
30-day money-back guarantees,
and 24-hour, 7-day-a-week technical
support by trained NEC technicians.

Direction Add-Ons:

- Iomega® 100MB Internal Zip® Drive with One Cartridge, add \$99
- Hewlett-Packard® DeskJet 694C Printer, add \$239
- Hewlett-Packard LaserJet 6Lse Printer, add \$399
- Diamond Monster 3D II 12MB Graphics Accelerator Card with 3Dfx® Voodoo™ Technology, add \$249
- DVD-ROM Drive with Decoder Card, add \$279
- Creative Labs AWE 64D PCI Wavetable Audio Card, add \$99



Free Microsoft® Windows® 98 Upgrade Coupon Available with Purchase of Any Direction PC.

Direction SPB400

- 400MHz Pentium II processor
- ATX Minitor or Desktop Tool-Less Chassis
- 128MB SDRAM
- 512KB L2 Cache
- New 14.4GB Ultra ATA Hard Drive (7,200 rpms)
- 32X Maximum Variable-Speed CD-ROM Drive
- Diamond Viper® AGP 4MB SGRAM Graphics Card
- Altec Lansing® ACS-410 Surround Sound Speaker System with ACS-251 Subwoofer
- PCI Wavetable Audio
- U.S. Robotics® x2™ 56Kbps* Winmodem™
- NEC C900™ 19" Monitor (18" viewable, .26dp)
- Microsoft Windows 95
- Microsoft Home Essentials™ 98
- Microsoft IntelliMouse®, NEC Palmrest Keyboard, and Microphone

\$3199

Lease From: \$118/mo. Code #D5110

Direction SPB400

- 400MHz Pentium II processor
- ATX Minitor or Desktop Tool-Less Chassis
- 128MB SDRAM
- 512KB L2 Cache
- New 9.1GB Ultra ATA Hard Drive (7,200 rpms)
- 32X Maximum Variable-Speed CD-ROM Drive
- Diamond Viper AGP 4MB SGRAM Graphics Card
- Altec Lansing ACS-45 PowerCube™ Speaker System with Subwoofer
- PCI Wavetable Audio
- U.S. Robotics x2 56Kbps* Winmodem
- NEC C900 19" Monitor (18" viewable, .26dp)
- Microsoft Windows 95
- Microsoft Home Essentials 98
- Microsoft IntelliMouse, NEC Palmrest Keyboard, and Microphone

\$2799

Lease From: \$104/mo. Code #D5111

Direction SPB400

- 400MHz Pentium II processor
- ATX Minitor or Desktop Tool-Less Chassis
- 64MB SDRAM
- 512KB L2 Cache
- 4.3GB Ultra ATA Hard Drive
- 32X Maximum Variable-Speed CD-ROM Drive
- Diamond Viper AGP 4MB SGRAM Graphics Card
- Altec Lansing ACS-90 Speakers
- PCI Wavetable Audio
- U.S. Robotics x2 56Kbps* Winmodem
- NEC C700™ 17" Monitor (16" viewable, .27dp)
- Microsoft Windows 95
- Microsoft Home Essentials 98
- Microsoft IntelliMouse, NEC Palmrest Keyboard, and Microphone
- 3-Year UltraCare Limited Warranty with 1-Year On-Site Service

\$2299

Lease From: \$85/mo. Code #D5112

Call now to order your customized PC.

1-888-863-2669

www.necnow.com

Mon-Fri 8am-8pm EST

Dept. No. PM788A

<enter here>

NEC

Introducing the 17 inch (16.0" viewable)

The GS771 redefines sleek.

The new GS771 is ViewSonic's smallest 17" (16.0" viewable) monitor. In fact, its compact footprint takes up less desktop space than a conventional 14" monitor.

But when it comes to performance, it's a lot bigger than it looks. The key is SuperClear™, ViewSonic's innovative screen technology that achieves the sharp text available in high contrast CRTs with the bright, vivid colors found in aperture grille monitors.

A big idea.

For the bustling business, the home user or anyone with limited space, the GS771 "short depth" monitor is ideal for color intense desktop applications, business graphics, web page design and spreadsheets.

Both PC and Mac® compatible, the GS771 meets TCO '95 and NUTEK standards which reduce heat emissions, lower power consumption and mandate the use of recyclable parts. And, it's backed by a limited three-year warranty—one of the best in the business—as well as a 48-hour Express Exchange™ Service option.

ViewSonic GS771

- 17" Monitor (16.0" viewable)
- 1,024 x 768 optimum resolution at 87Hz
- SuperClear™
- TCO '95 and NUTEK Compliance
- Plug & Play+

No small feat.

The space saving GS771 "short depth" monitor is the latest example of ViewSonic's leadership in the 17" (various viewable) market. Only our engineers could design a performer this big with a footprint this small. Grab a tape measure and see for yourself.

Call ViewSonic® at (800) 888-8583 and ask for agent 81284 for the dealer nearest you, or visit our website at: www.viewsonic.com.

(909) 869-7976 • Fax: (909) 869-7958 • Internet: www.viewsonic.com
Specifications subject to change without notice • Copyright © 1998, ViewSonic Corporation • All rights reserved
Corporate names and trademarks are the property of their respective companies



with the body of a 14 inch.



Choose 298 at www.pcmag.com/infolink

Picture Perfect

E-commerce has had many hurdles to clear, but as the Web becomes more ubiquitous, its ultimate success is inevitable—especially among those who use catalogs and direct marketing the most. Credit cards have proven to work just fine so far in electronic

commerce, although the possibility remains for more sophisticated versions of digital cash.

The Web as a replacement for catalogs has been very much a mixed bag to date. All of the obvious benefits—limitless space; hyperlinks to pique and satisfy the customer's curiosity; instant, continuous updates; no postage; and no printing costs—are all to the good. The bad? The photographs.

Print is still vastly better than computer screens in terms of resolution, but a print image has a fixed size and resolution, while a screen image doesn't have to have one. Key players in the graphics industry have teamed up to create the FlashPix standard, which gives you variable resolution.

In the Live Picture implementation, you store a FlashPix image on your server and put the link on your Web page. The difference is that when you click on the link, the server sends back that portion of the picture on which you clicked in higher resolution. Click again and the software zooms in farther, until you get all the way down to the pixels.

It's all JPEG to your browser: no plug-ins, no helper apps. In short, the server software delivers all the resolution you can handle and no more. The saving in bandwidth is considerable, with no loss in image quality.

With high-enough photographic resolution, your customers can see details that they'd be able to see only in person, far better than in any catalog. Although Live Picture has examples at its site (www.livepicture.com), I decided to put its format to the test and put up some additional images from one of my own Web pages. I also wanted to see what was involved in preparing high-quality images for the Web.

The first thing I learned is that digital photography need not apply. If you want real resolution, go with conventional photography and scan transparencies or large prints at a very high resolution. I'm fortunate to have a friend, Dennis Thovson (dthovson@worldnet.att.net), who has a graphics business and unlimited technical curiosity. He brought over his latest Nikon artillery and a bunch of

Kodak Pro Gold 100 film, and we spent a day photographing my benchtop milling machine. You can see the results at www.billsbest.com/thailas.html.

After the film came back from the lab, Dennis scanned the slides on a Polaroid film scanner at full resolution, around 4,300 dpi. Next we did the usual Photoshop manipulations, including cropping and color correction. The files were huge, about 20MB in size, but they shrank to around 1MB in JPEG format without a perceptible loss in quality.

We downloaded and installed the Live Picture plug-in for Photoshop, then saved the images in FlashPix format. The files were only half the size of the corresponding JPEGs. You can see the results of our labors at the above Web site. Notice how you can zoom in to some fairly incredible detail before the image starts to fall apart.

If you visit enough sites that feature FlashPix images, you'll probably want to download the plug-in from the Live Picture site or use the company's Java viewer. Although it's not necessary, it does offer some convenience in terms of being able to pan and manipulate the image and includes a print button. The FlashPix format can also store 3-D images, and 3-D add-ins can manipulate them, so you can see the top, back, and bottom of an object, too.

As new as the FlashPix format is, I've already seen some unfortunate corner cutting. Some sites have simply scanned images from printed pages instead of going back to the original photographs.

Other sites have (evidently) tried to economize on storage with low-pixel-density images that fall apart as soon as you try to get in close.

These low-rent approaches won't cut it. Nothing substitutes for top-quality photography and high-resolution scans, but you can overdo a good thing. A reasonable zoom range is 10:1, so assuming a 96-dpi screen resolution, there's not much point in going beyond 960 dpi in your edited photo.

Live Picture is but one of the implementations of FlashPix. To see some other exciting applications, take a look at www.flashpix.com and maybe order up a FlashPix CD next time you process a roll of film. **PC**



HOT SHOTS
Electronic
commerce is
moving into high
gear, and I've
got the pictures
to prove it.

Great performance...easy to recognize, hard to duplicate.

21" 110 khz
\$1199

Winning as many awards as we have sets iiyama apart from the competition. And for good reason. All iiyama monitors, including our newest line of 21" CRTs are engineered to meet the highest standards of quality and performance, allowing the user to run the monitor at its highest specified performance and refresh rate.

Consistent quality is maintained because iiyama monitors come from our ISO 9001 certified factories in Japan. We don't outsource or OEM our monitors, so we can always be 100% certain that our high standards are met.

So for high performance at an unbeatable price... get the monitor that can't be duplicated.



	Model/ Viewable Area	Dot Pitch/ CRT Type	Max. Horizontal Scan Rate	Max. Resolution	Est. Street Price
21"	VisionMaster Pro 502 (19.5" VIS)	0.28mm/AG	110khz	1800 x 1440@74hz	\$1,199
	VisionMaster Pro 501 (19.5" VIS)	0.28mm/AG	96khz	1600 x 1200@75hz	\$1,139
	VisionMaster 502 (19.5" VIS)	0.27mm/dp	110khz	1800 x 1440@74hz	\$1,199
	VisionMaster 501 (19.5" VIS)	0.27mm/dp	96khz	1600 x 1200@75hz	\$1,139
19"	VisionMaster 450 (18.0" VIS)	0.26mm/dp	102khz	1600 x 1200@80hz	\$799
17"	VisionMaster Pro 17 (15.9" VIS)	0.25mm/AG	92khz	1600 x 1200@74hz	\$579
	VisionMaster 17ES (15.7" VIS)	0.26mm/dp	86khz	1600 x 1200@69hz	\$569
	VisionMaster 17 (15.7" VIS)	0.26mm/dp	86khz	1600 x 1200@69hz	\$488
15"	VisionMaster 350 (13.7" VIS)	0.28mm/dp	69khz	1280 x 1024@60hz	\$248



iiyama

For the name of your local dealer call: (800) 594-7480 • www.iiyama.com



© 1998 iiyama North America, Inc. All rights reserved. iiyama, the iiyama logo, and the RSVP logo are trademarks of iiyama North America, Inc. All other trademarks are the properties of their respective owners.

**8 hours a day/5 days a week/50 weeks a year MTBF excludes CRT life, which may vary from model to model. Prices and specifications are valid as of 02/05/98. Estimated Street Price is shown, actual price may vary. Prices do not include shipping, handling and any applicable taxes. Specifications are subject to change without notice. As an Energy Star™ Partner, iiyama has determined that this product meets the Energy Star™ Guidelines for energy efficiency. For more information, please write us at 575 Anton Blvd., Suite 590, Costa Mesa, CA 92626. 800/594-7480, 714/437-5111, Fax: 714/437-5982. Home Page: www.iiyama.com.



January 5 1998
VisionMaster Pro 17



Perfect Five-Star Rating
January 1998
VisionMaster 450
VisionMaster Pro 500



Perfect Five-Star Rating
November 1997
VisionMaster Pro 17



Performance & Technical Excellence
March 1997
VisionMaster Pro 21



Six Time Winner
Jan 1997, Feb 1997, March 1997,
April 1997, May 1997, June 1997
VisionMaster Pro 21



October 7, 1997
VisionMaster Pro 17



March 1997
VisionMaster Pro 21



Six Time Winner
July 1996, Jan 1997, March 1997,
July 1997, Sept 1997, Jan 1998
VisionMaster Pro 17
April 1998
VisionMaster 450

Choose 084 at www.pcmag.com/infolink

"Bill G., Come Home!"

This is being written on a backup computer, since my primary PC is being rebuilt from a horrendous crash that resulted in numerous "Windows protection fault" messages on boot-up. This particular message doesn't come on a blue screen but a black one. When I

mentioned that, my service tech at Microsoft said, "Uh-oh!" After 4 hours, we were unable to resolve the problem. It looked as if something had happened to the Registry, which is essentially voodoo; nobody at Microsoft knows anything about the Registry except the guy who designed it, and nobody seems able to find him.

The weird thing is that a completely unrelated machine had a similar problem after I installed and then uninstalled Windows 98. Neither machine used any software from the other (except Windows), and the machines were not networked. The other machine just couldn't handle the Win 98 uninstall, but my primary machine had never seen Win 98. Its problems began after I downloaded and installed a Win 95 USB patch from the Microsoft site. The download could have corrupted something; nothing else was done to the system.

As I write this, I've spent 8 hours so far working on these problems. I wasted more time trying to reinstall Windows, after screwing with the machine so much that most of the drivers were either blown off the system or lost. I then installed Win 98 on the machine after I erased the hard disk (on the advice of my techie contact at Microsoft, who told me it should work better on a *clean* system). This was a joke, since the machine booted with a 16-color display, and the software that upgrades the display drivers said it needed 256 colors to run! Catch-22 number one. I had decided to go back to Win 95, but the disks were for a Win 95 *upgrade*. This made a mockery of the boot disk. Another Catch-22!

So, as I go into day two of this nonsense, I see Mr. Bill Gates roaming around the country, giving a speech at *Time* magazine's 75th-anniversary party and babbling in his ill-written daily diary in *Slate* magazine. Knowing he's a micromanager who gets involved in everything at Microsoft, and knowing he hasn't spent as much time at the company as usual, I am begging him to go back to work, if he actually cares about Windows entropy.

Has Bill noticed (in report after report from PBS, newspapers, and user groups) that people believe Microsoft

products are inferior? Then there is the perception that Microsoft *only* copies the ideas of others. When confronted recently with the latter perception by a *New York Times* reporter, Gates said that the notion was "beyond bizarre," as if he'd never heard such a thing. This question was asked

when Bill was showing off a Microsoft-designed "Palm PC" that was a feature clone of the PalmPilot. The company even took the name *Palm*, saying it was generic. Yeah, right. Does Microsoft think that the word *Windows* is generic? I think not. This is not about using the ideas of the PalmPilot, but about doing a PalmPilot clone in the first place. Why, oh why, is Microsoft spending time and manpower on copycat gizmos, when the error handling in Windows stinks and the machines are crashing more often as they get older? Fix this first!

There are probably a couple of guys reading this column and saying to themselves, "Hey, my machine never crashes." Fine, but you don't push your machine very hard. Anyone who uses a machine to the hilt discovers that it doesn't work as advertised. Meanwhile, programmers are adding features we don't need.

In Win 98, for example, if you open one of the dialog boxes on the desktop, you'll see that instead of just popping up, it squeezes onto the screen in a new way. With machines crashing left and right, why is coding like this being done in the first place? Doesn't anyone at Microsoft think that resolving bugs is more important than

adding unnecessary nonsense? Maybe not. It's not that I don't think some of these visual features are cool. They are. But how about getting this OS rock-solid first?

Here's the worst part of what is happening: Because of the still unstable aspect of this OS, the only people who can use computers and be sure they won't crash are those who buy factory-installed systems running something like Microsoft Works and never upgrade or add third-party software. For all practical purposes, this open system of ours has become proprietary. Proprietary to Microsoft. Hmmm; maybe Bill doesn't have to work. This may have been his intention all along.



BROKEN WINDOWS

Crashes would never happen if Microsoft concentrated on fixing what's wrong in its OS.

Ask about our **FREE CPU-Cool™ Deal!**

Bullet-Proof Upgrades.

POWER SUPPLIES

"If you're building a machine you need to trust, go with PC Power & Cooling products. Get its case, power supply (the best, period), and CPU fan." John Dvorak, *PC Computing*, August, 1997.

ECONOMICAL

Save on quality UL/ULC approved power supplies!
STANDARD 230 SLIM \$59
STANDARD 235 ATX \$69
STANDARD 230 DESK or TOWER \$79

ULTRA-QUIET



Toss the earmuffs! The best way to get relief from a noisy computer is with a **Silencer®** power supply. Its high-efficiency fan reduces noise by up to 90%! A *multimedia* must.

SILENCER 230 SLIM \$69
SILENCER 235 ATX \$79
SILENCER 270 SLIM \$109
SILENCER 270 DESK or TOWER \$119
SILENCER 275 ATX \$129

HIGH-PERFORMANCE



For power that won't skip a beat during hard drive access or line voltage sags, upgrade your PC with a premium **Turbo-Cool®** power supply. You'll get 50%-100% more power, built-in line conditioning, super-tight regulation, ultra-clean output, enhanced cooling, UL/ULC/TUV, and 3-5 year warranty!

TURBO-COOL 300 SLIM \$109
TURBO-COOL 300 TOWER \$119
TURBO-COOL 300 ATX \$129
TURBO-COOL 400 SLIM \$189
TURBO-COOL 400 TOWER \$199
TURBO-COOL 400 ATX \$219
TURBO-COOL 600 TOWER **NEW!** \$399

ENCLOSURES

ECONOMICAL



Now, with a single case, you can build your choice of either an AT or ATX computer! Our popular **Personal Mid-Tower** case features rigid construction, 6 drive bays (upgradable to 8), and easy-access side panels and M/B tray. A real deal!
PERSONAL MID-TOWER \$69

PROFESSIONAL SERIES

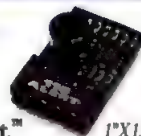


Distinctive style, heavy-duty construction, 10 drive bays, AT/ATX compatible, extra cooling and EMI suppression! You can't beat our all-steel, **American-made**, full-tower enclosures. Choice of beige (standard model) or deluxe deep-blue finish highlighted with a **bright chrome bezel!**

SOLID-STEEL TOWER \$289
DELUXE CHROME TOWER **NEW!** \$495

OVER-TEMP ALARM

Don't let a bad fan or a clogged filter cost you your system! Detect overheating, *before* damage occurs, with a **110 Alert™**.



110 ALERT \$19

REDUNDANT POWER



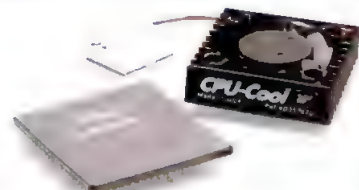
Get redundant 250W power, in 1 slim unit, with our economical **Two-in-One 500**.

For mission-critical reliability (5,000,000 hr. MTBF), choose from our *hot-swappable* **TwinPower™** series!

TWO-IN-ONE 500 \$219
TWIN-POWER 800 ATX \$819
TWIN-POWER 1200 **NEW!** \$1089

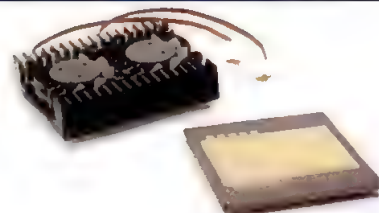
CPU COOLERS

PENTIUM® & 486



486s and Pentiums run hot, often exceeding 210°F! Cool'em by 90°F-120°F with genuine, low-profile **CPU-Cool™** coolers. Each consists of a long-life, ball-bearing fan *integrated* into a patented, die-cast heat sink. Last 10X longer and are 40% thinner than cheap, bulky imitations! USA-made. 5-year warranty.
CPU-COOL 1.9T (486, 75-133 P5) \$17
CPU-COOL 1.9W (150-200 P5) \$21
CPU-COOL Z1 (All 233-300 Slt 7) **NEW!** \$24

PENTIUM® PRO

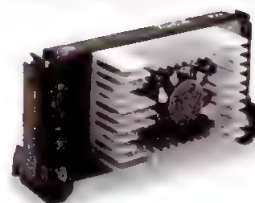


Check the specs for the best P6 thermal solutions!

Sink/Ann. Fan	Std. Cooler	CPU-Cool 3.2	Dual CPU-Cool
Thermal Resist: 1.5°C/W	1°C/W	0.8°C/W	0.6°C/W
3-Yr. Fail Rate: 1:100	1:10	1:1,000	1:1,000,000

CPU-COOL 3.2 \$24
DUAL CPU-COOL® (Fault-Tolerant) \$34

PENTIUM® II



Our **CPU-Cool K1** is one cool cooler! Thin (1.1"), effective (0.6°C/W vs. Intel's 0.8°C/W spec.), reliable (100,000+ hr. MTBF), and easy to install!

CPU-COOL K1 (233-333 PII) **NEW!** \$24

Choose 080 at www.pcmag.com/infolink
 1985-1998

14th Year

PC POWER & COOLING, INC.

5995 Avenida Encinas, Carlsbad, CA 92008 • (760) 931-5700 • (800) 722-6555 • Fax (760) 931-6988

Web: <http://www.pcpowercooling.com>. Hours: 7 a.m.-6 p.m. (PT) Mon.-Fri. Terms: Visa, MC, COD, or PO. Warranty: 5-yrs. for CPU-Cool and Turbo-Cool 600; 3-yrs. for Turbo-Cool (except 600), 2-yrs. for all others. Silencer, Turbo-Cool, TwinPower, CPU-Cool, Dual CPU-Cool, and 110 Alert are trademarks or reg. trademarks of PC Power & Cooling, Inc. Pentium is a reg. trademark of Intel Corp. © 1998 PC Power & Cooling, Inc.

Inside Track

The plot thickens with Intel and its slow march to domination in the micro-processor arena. No, wait! Intel arrived there years ago! Now the march is to the different drummer of maintenance and consolidation. Everything is boiling down to the Intel IA-64, the so-called Merced, due in a machine near you in mid to late 1999 (which means working chips will be on your desktop around April 2000). In the meantime, Intel faces numerous challenges, including continued confusion as to how these new chips will **handle x86 instructions**. There seems to be some debate as to whether the implementation will be done in hardware or software or both. Hardware would be more efficient, but software would save real estate. And there's the issue of performance. If the x86 subset performs too well, it's likely that coders will never write code for the Merced native instruction set. This is **Intel's biggest dilemma**. With an installed base of millions and millions of x86 machines, **exactly who does Intel think will code for the new instruction set?** Surely Intel has noticed that **MMX hasn't set the world on fire**. Apparently, a few programs look for MMX and use the extra 57 instructions when needed, but this is hardly seen as a requirement for success.

Intel set the stage for doubting Thomases years ago when it **screwed the developer community** by creating the 486SX and 487 chips. In the original 486, Intel had made floating-point circuitry a **permanent part of the chip**, letting coders take advantage of high-speed floating-point operations. Then out of the blue, as part of a **dubious marketing decision**, Intel created the 486SX, which was actually a 486 with the built-in floating-point circuitry disabled, sold as some sort of fake low-end chip. Coders were aghast that their beloved and seemingly permanent hardware floating-point function was suddenly pulled out from under them **like a cheap rug**. This was not a good precedent to set. Now Intel is talking about adding new instructions beyond MMX, which everyone refers to as MMX/2, to the Pentium. The new chip set adds 70 more instructions that let the Pentium do **high-speed 3-D operations** for as yet unimagined applications. Intel refers to the new chip as the Katmai NI (New Instructions), succeeding the next (and perhaps last) generation of the Pentium Katmai chip. The Katmai NI should appear in volume next year.

AMD should be able to beat Intel to the punch with its K6-3d, but I still wonder what's driving this trend. I must have missed the research report that says everyone is clamoring for 3-D graphics. Though game designers should benefit from 3-D, they hardly provide a rationale for a new architecture. It's apparent that workaday coders

*With an installed
base of millions and
millions of x86 machines,
exactly who does Intel
think will code for the
new instruction set?
Surely Intel has noticed
that MMX hasn't set
the world on fire.*

will continue to write for the basic x86 instruction set, and only a genuine platform shift will change this.

Sounding Better All the Time Dept.: If you haven't noticed, the big names in audio, such as Bose, JBL, and others are now bundling branded speakers with many machines. New lines of inexpensive computers now have various brand-name speakers attached directly to the monitors—with the speaker companies' logos displayed. One player entering this field late is Harmon International, and I suspect it will begin to gobble up market share. Harmon is the large audio conglomerate that owns AKG, Harmon-Kardon, Infinity, JBL, Lexicon, Mark Levinson, and probably a few other companies I can't think of. The company is big

and has a large R & D department. I was unofficially told by some folks there that the **next target for quality audio** will be, of all things, the laptop computer. You heard it hear (pun intended) first. Apparently, the typical laptop has speakers that crap out below about 300 to 350 Hz (or cycles per second). Middle C on a piano is 256 Hz; that note is considered to be the middle of the typical sound spectrum. This means that **more than half the spectrum is lost** with these squeaky speakers. The goal over the next year is to get good sub-100-Hz sound from a laptop, which apparently can be done. Within the next year or so, CD music played on a laptop **may actually sound good**. Now all we need is a floppy disk-size subwoofer to go with the unit.

100X CD-ROM Dept.: New technologies come from great creativity. Look for the Zen Research logo on the CD-ROM drives of the future and you'll find products that result from great creativity. Zen Research has recently developed a 40X CD-ROM drive that takes unique advantage of **slower rotation speed**. Whaaa? As many of us know, high-speed CD-ROM drives spin so fast that the data can seldom be read at full tilt, so the drive gears down. Zen decided to use multiple beams (just as older hard disks used multiple heads) to increase access time and throughput. Using seven beams, for example, would let a reliable 6X drive deliver 42X performance. The result is **real 42X performance**, not hit-or-miss performance. The company expects to license its patented technology to most drive makers by year's end. Since multiple-beam technology creates a genuine performance boost, some think it will **pave the way for the high-performance bootable "OS on a CD-ROM"** market. Most new BIOS chips are provisioned for booting from the CD-ROM drive, but slow CD-ROM drive speeds have made this market impractical. True 40X and higher speeds give CD-ROM drives actual hard disk performance. Will wonders never cease? **PC**

DELL[®] INSPIRON[™] NOTEBOOKS

Common features: ♦ Modular Options Bay accepts 24X Max[™] Variable CD-ROM, 3.5" Floppy Drive (both included) or Optional 2nd Smart Li-Ion Battery ♦ 512KB L2 Pipeline ♦ Zoom Video and USB Ports ♦ Smart Lithium Ion Battery ♦ Cardbus Ready/Fast IR1.1 ♦ MS[®] Windows[®] 95 ♦ **FREE MS Windows 98 Upgrade Packet** ♦ MS Internet

NEW DELL INSPIRON 3200 D266XT 266MHz PENTIUM[®] II PROCESSOR FEATURING MMX[™] TECHNOLOGY

Common features listed above plus:

- 13.3" XGA Active Matrix TFT Display
- 144MB SDRAM
- 4GB Ultra ATA Hard Drive
- 128-bit Graphics Accelerator with 65K Colors at 1024x768
- 56K Capable[™] K-Flex Modem
- Leather Carrying Case
- MS Office 97 Small Business Edition
- 6.9 Pounds*

*Inspiron Port Replicator, add \$159.
*3Com[®] 10/100 Fast Ethernet Adapter, add \$169.

\$3999

Business Lease[®]: \$147/Mo., 36 Mos.
Order Code #890401

NEW DELL INSPIRON 3200 D266XT 266MHz PENTIUM II PROCESSOR FEATURING MMX TECHNOLOGY

Common features listed above plus:

- 13.3" XGA Active Matrix TFT Display
- 80MB SDRAM
- 4GB Ultra ATA Hard Drive
- 128-bit Graphics Accelerator with 65K Colors at 1024x768
- 56K Capable[™] x2 Modem
- 2nd Smart Lithium Ion Battery
- Deluxe Nylon Carrying Case
- MS Office 97 Small Business Edition
- 6.9 Pounds*

*Upgrade to 96MB SDRAM, add \$99.
*Inspiron Port Replicator, add \$159.

\$3699

Business Lease[®]: \$136/Mo., 36 Mos.
Order Code #890403

NEW DELL INSPIRON 3200 D233XT 233MHz PENTIUM II PROCESSOR FEATURING MMX TECHNOLOGY

Common features listed above plus:

- 13.3" XGA Active Matrix TFT Display
- 64MB SDRAM
- 4GB Ultra ATA Hard Drive
- 128-bit Graphics Accelerator with 65K Colors at 1024x768
- 56K Capable[™] K-Flex Modem
- Leather Carrying Case
- MS Office 97 Small Business Edition
- 6.9 Pounds*

*Upgrade to a 266MHz Pentium II Processor, add \$200.
*Upgrade to 96MB SDRAM, add \$199.

\$3299

Business Lease[®]: \$121/Mo., 36 Mos.
Order Code #890405

DELL INSPIRON 3000 M233XT 233MHz PENTIUM PROCESSOR WITH MMX TECHNOLOGY

Common features listed above plus:

- 13.3" XGA Active Matrix TFT Display
- 64MB SDRAM
- 3.2GB Ultra ATA Hard Drive
- 128-bit Graphics Accelerator with 65K Colors at 1024x768
- 56K Capable[™] K-Flex Modem
- MS Office 97 Small Business Edition
- 6.9 Pounds*

*Upgrade to a 266MHz Pentium Processor, add \$100.
*Upgrade to 80MB SDRAM, add \$99.
*2nd Smart Lithium Ion Battery, add \$169.

\$2999

Business Lease[®]: \$114/Mo., 36 Mos.
Order Code #890407

THE NEW DELL INSPIRON 3200, POWERED BY THE PENTIUM[®] II PROCESSOR.

DELL LATITUDE NOTEBOOKS

Common features: ♦ Modular Options Bay accepts 20X Max[™] Variable CD-ROM, 3.5" Floppy Drive (both included) or Optional 2nd Smart Li-Ion Battery ♦ 512KB L2 Pipeline Burst ♦ Smart Lithium Ion Battery ♦ USB & IrDA 1.1 Standard Compliant ♦ Cardbus Ready ♦ MS Windows 95 ♦ MS Internet Explorer ♦ Touchpad ♦ 3-Year Limited Warranty

DELL LATITUDE CP M233XT 233MHz PENTIUM PROCESSOR WITH MMX TECHNOLOGY

NETWORK-TAILORED NOTEBOOK
Common features listed above plus:

- 13.3" XGA Active Matrix TFT Display
- 128MB EDO RAM
- 4GB Ultra ATA Hard Drive
- 128-bit Graphics Accelerator with 65K Colors at 1024x768
- 56K Capable[™] K-Flex Modem
- C-Port Advanced Port Replicator with 3Com 10/100 Fast Ethernet Adapter
- Deluxe Nylon Carrying Case
- MS Windows NT[®] Workstation 4.0
- 6.4 Pounds*

\$4699

Business Lease[®]: \$173/Mo., 36 Mos.
Order Code #890402

DELL LATITUDE CP M233XT 233MHz PENTIUM PROCESSOR WITH MMX TECHNOLOGY

NETWORK-TAILORED NOTEBOOK
Common features listed above plus:

- 13.3" XGA Active Matrix TFT Display
- 80MB EDO RAM
- 4GB Ultra ATA Hard Drive
- 128-bit Graphics Accelerator with 65K Colors at 1024x768
- 56K Capable[™] K-Flex Modem
- Leather Carrying Case
- 6.4 Pounds*

*Upgrade to 128MB EDO RAM, add \$299.
*Upgrade to MS Windows NT Workstation 4.0, add \$85.

\$3999

Business Lease[®]: \$147/Mo., 36 Mos.
Order Code #890404

DELL LATITUDE CP M233XT 233MHz PENTIUM PROCESSOR WITH MMX TECHNOLOGY

NETWORK-TAILORED NOTEBOOK
Common features listed above plus:

- 13.3" XGA Active Matrix TFT Display
- 64MB EDO RAM
- 4GB Ultra ATA Hard Drive
- 128-bit Graphics Accelerator with 65K Colors at 1024x768
- 6.4 Pounds*

*Upgrade to 96MB EDO RAM, add \$199.
*C-Port Advanced Port Replicator with 3Com 10/100 Fast Ethernet Adapter with Monitor Stand, add \$349.
*56K Capable[™] K-Flex Modem, add \$199.

\$3599

Business Lease[®]: \$132/Mo., 36 Mos.
Order Code #890406

DELL LATITUDE CP M233ST 233MHz PENTIUM PROCESSOR WITH MMX TECHNOLOGY

NETWORK-TAILORED NOTEBOOK
Common features listed above plus:

- 12.1" SVGA Active Matrix TFT Display
- 48MB EDO RAM
- 3.2GB Ultra ATA Hard Drive
- 128-bit Graphics Accelerator with 16 Million Colors at 800x600
- 56K Capable[™] K-Flex Modem
- 5.9 Pounds*

*Upgrade to a 4GB Ultra ATA Hard Drive, add \$99.
*2nd Smart Lithium Ion Battery, add \$169.
*Deluxe Nylon Carrying Case, add \$69.

\$3299

Business Lease[®]: \$121/Mo., 36 Mos.
Order Code #890408

These are just a few of the thousands of configurations available.



Pricing is not discountable. *For a complete copy of Guarantees or Limited Warranties, please write Dell USA L.P., Attn: Warranties, One Dell Way, Round Rock, TX 78682. †Business leasing arranged by Dell Financial Services L.P., an independent entity, to qualified customers. Above lease payments based on 36-month lease, and do not include taxes, fees, shipping charges, subject to credit approval and availability. Above lease terms subject to change without notice. ‡System weight with floppy drive or CD-ROM in options bay. †On-site service guarantee provided pursuant to a service contract with a third-party provider. May not be available in certain remote areas. **20X Max/9X Min. ***24X Max/10X Min. ****x2 products are capable of 56Kbps downloads. Due to FCC rules that restrict power output, however, current download speeds are limited to 53Kbps. Upload speeds are limited to 33Kbps. Actual speeds may vary depending on line conditions. †Actual speeds may vary depending on line conditions. Due to FCC limitations, speeds in the U.S. are less than 56Kbps. †Each Dell Inspiron notebook, with Windows 95 factory installed, shipped after 4/1/98 and prior to 9/1/98, will be eligible for a free upgrade to Microsoft Windows 98 when available, subject to terms and conditions contained in Windows 98 upgrade packet shipped with system. Length of offer subject to change. †Prices and specifications valid in the U.S. only and subject to change without notice. The Intel Inside logo and Pentium are registered trademarks and MMX is a trademark of Intel Corporation. MS, Windows and Windows NT are registered trademarks of Microsoft Corporation. 3Com is a registered trademark of 3Com Corporation. Dell, the Dell logo and Latitude are registered trademarks, Inspiron and ExpressCharge are trademarks of Dell Computer Corporation. ©1998 Dell Computer Corporation. All rights reserved.

Burst Cache ♦ Stereo Speakers with 3D Surround Sound and Yamaha Software Wavetable Explorer ♦ Touchpad ♦ Extendable 1-Year Limited Warranty†

DELL INSPIRON 3000 M233ST
233MHz PENTIUM PROCESSOR
WITH MMX TECHNOLOGY

Common features listed above plus:

- 12.1" SVGA Active Matrix TFT Display
- 48MB SDRAM
- 3.2GB Ultra ATA Hard Drive
- 128-bit Graphics Accelerator with 16 Million Colors at 800x600
- MS Office 97 Small Business Edition
- 6.4 Pounds*
- ★ Upgrade to 80MB SDRAM, add \$199.
- ★ Upgrade to a 4GB Ultra ATA Hard Drive, add \$99.
- ★ 56K Capable™ K-Flex Modem, add \$199.

\$2499

Business Lease*: \$95/Mo., 36 Mos.
Order Code #890409

DELL INSPIRON 3000 M200ST
200MHz PENTIUM PROCESSOR
WITH MMX TECHNOLOGY

Common features listed above plus:

- 12.1" SVGA Active Matrix TFT Display
- 32MB SDRAM
- 3.2GB Ultra ATA Hard Drive
- 128-bit Graphics Accelerator with 16 Million Colors at 800x600
- MS Office 97 Small Business Edition
- 6.4 Pounds*
- ★ Upgrade to a 233MHz Pentium Processor, add \$200.
- ★ Upgrade to 64MB SDRAM, add \$199.
- ★ Upgrade to a 4GB Ultra ATA Hard Drive, add \$99.

\$2199

Business Lease*: \$83/Mo., 36 Mos.
Order Code #890411

DELL NOTEBOOK POWER UPGRADES

DELL INSPIRON

- Upgrade from 32MB SDRAM to 64MB SDRAM, add \$199.
- Upgrade from 64MB SDRAM to 96MB SDRAM, add \$199.
- Upgrade from a 3.2GB Ultra ATA Hard Drive to a 4GB Ultra ATA Hard Drive, add \$99.
- 56K Capable™ K-Flex Modem, add \$199.
- 56K Capable** x2 Modem, add \$149.
- 2nd Smart Li-Ion Battery, add \$169.
- Leather Carrying Case, add \$99.
- Deluxe Nylon Carrying Case, add \$69.
- Inspiron Port Replicator, add \$159.
- 3Com 10/100 Fast Ethernet Adapter, add \$169.
- Upgrade to MS Office 97 Professional, add \$199.

DELL LATITUDE*

- Upgrade from 32MB EDO RAM to 64MB EDO RAM, add \$199.
- Upgrade from 64MB EDO RAM to 96MB EDO RAM, add \$199.
- Upgrade from a 2.1GB Ultra ATA Hard Drive to a 3.2GB Ultra ATA Hard Drive, add \$99.
- Upgrade from a 3.2GB Ultra ATA Hard Drive to a 4GB Ultra ATA Hard Drive, add \$99.
- C-Port Advanced Port Replicator with Integrated 3Com 10/100 Fast Ethernet Adapter, add \$299.
- C-Dock Expansion Station with Integrated 3Com 10/100 Fast Ethernet Adapter, Media Bay, Ultra SCSI-II Port, Half-Height PCI Slot and Monitor Stand, add \$649.
- 56K Capable™ K-Flex Modem, add \$199.
- Leather Carrying Case, add \$99.

MAXED-OUT ON SPEED, NOT PRICE.

Cache ♦ Stereo Speakers with 3D Surround Sound and Yamaha Software Wavetable ♦ 1-Year On-site* Service

DELL LATITUDE CP M233ST
233MHz PENTIUM PROCESSOR
WITH MMX TECHNOLOGY

NETWORK-TAILORED NOTEBOOK

Common features listed above plus:

- 12.1" SVGA Active Matrix TFT Display
- 32MB EDO RAM
- 3.2GB Ultra ATA Hard Drive
- 128-bit Graphics Accelerator with 16 Million Colors at 800x600
- 5.9 Pounds*
- ★ Upgrade to 64MB EDO RAM, add \$199.
- ★ Upgrade to a 4GB Ultra ATA Hard Drive, add \$99.
- ★ 56K Capable™ K-Flex Modem, add \$199.
- ★ Leather Carrying Case, add \$99.

\$2999

Business Lease*: \$114/Mo., 36 Mos.
Order Code #890410

DELL LATITUDE CP M200SD
200MHz PENTIUM PROCESSOR
WITH MMX TECHNOLOGY

NETWORK-TAILORED NOTEBOOK

Common features listed above plus:

- 12.1" Fast Response Dual Scan Display
- 32MB EDO RAM
- 2.1GB Ultra ATA Hard Drive
- 128-bit Graphics Accelerator with 16 Million Colors at 800x600
- 5.9 Pounds*
- ★ Upgrade to 48MB EDO RAM, add \$99.
- ★ Upgrade to a 3.2GB Ultra ATA Hard Drive, add \$99.
- ★ 56K Capable**x2 Modem, add \$149.
- ★ 2nd Smart Lithium Ion Battery, add \$169.

\$2299

Business Lease*: \$87/Mo., 36 Mos.
Order Code #890412

If it's speed you want, then speed you'll get. Dell's new line of Inspiron™ 3200 notebooks feature the Intel Pentium® II processor – the fastest mobile processor available from Intel. And best of all, you don't have to spend extra for the latest technology. Not only will you get the fastest mobile Pentium II processor available, up to 266MHz, you will also get SDRAM, the fastest mainstream memory technology. To top that off, the Ultra ATA hard drives can transfer data twice as fast in burst mode as normal ATA hard drives. And, if that doesn't blow you away, then maybe the 13.3" XGA active matrix display and 3D surround sound will. The new Dell® Inspiron 3200 notebook with a Pentium II processor allows you to up the ante and hold on to your wallet. To take advantage, give us a call or stop by our website.

DELL®

TO ORDER TOLL-FREE

800-822-6039

TO ORDER ONLINE

www.dell.com/buydell

Mon-Fri 7am-9pm CT • Sat 10am-6pm CT
Sun 12pm-5pm CT • In Canada* call 800-233-0702
GSA Contract #GS-35F-4076D

Keycode #04709

**ORDER
ONLINE
24 HOURS
A DAY**

ACCESS SPECIAL PROMOTIONS
DESIGN YOUR IDEAL COMPUTER
CHECK THE STATUS OF YOUR ORDER
ACCESS 24HR ONLINE TECH SUPPORT



With 8MB of AGP graphics Ellen will open more than just Windows®



Introducing the Matrox Productiva G100 video card. 8MB for only \$99*.

She'll open windows of opportunity by getting the most from all her Windows 98 and Windows NT applications. Because successful people like Ellen know that only an 8MB

AGP video card can deliver the performance they need for demanding business applications. That's why the new 8MB Productiva G100 at \$99 is the card she'll choose.

Since its new MGA-G100 graphics chip is optimized for Windows, Ellen gets the fastest 2D acceleration in the industry, and support for today's 3D and video-based business applications. Productiva G100's 8MB of memory secures unparalleled display quality. In fact, even at 1600 x 1200 resolution, viewing true color documents or multiple windows is a breeze. And with hassle-free unified driver support for all of today and tomorrow's major operating systems, she's got reliable performance across the board.

Productiva G100 has improved the way Ellen does business. Award-winning technology built on twenty years of experience. It's exactly what she needs, at exactly the right price.

► Visit our Web site at www.matrox.com or call 1-800-362-9343

Matrox DVD Video
Hardware upgrade
for Productiva G100
(\$79 ESP)

Rainbow Runner G-Series
Video editing and TV upgrade
for Productiva G100

Productiva G100
Acceleration for demanding
business graphics
8MB AGP (\$99 ESP)



Matrox outperforms the competition		
Matrox Productiva G100 8MB (\$99)		122
ATI RPT-Work 4MB (\$129)	97	
ATI RPT-Work 4MB (\$129)	95	
Diamond Stealth 520 4MB (\$106) - N/S		
*9 Fi Realty 334 4MB (\$114) - N/S		

*Estimated Street Prices accurate at time of printing. All tests conducted by Matrox Graphics Inc. using a Dell Pentium I 300MHz with 64MB of RAM and 512K cache. Matrox Productiva AGP was tested with 8MB of memory using driver revision 3.82. ATI RPT-Work AGP was tested with 4 and 8MB of memory using driver revision 4.10.01.2778. Diamond Stealth-520 and Number Nine Fi Realty 334 were tested with 4MB of memory and using driver revision 4.10.01.101 and 4.10.1102 respectively. WinBench 98 Business tests conducted at 1280x1024@24bit at 75Hz refresh using small fonts under Windows 95 OSR2.

Choose 380 at www.pcmag.com/infolink

matrox

Road Shows Revisited

A while back, I wrote here about my experiences on the road, presenting slide shows from a notebook computer, and offered some tips to help traveling presenters survive and even look good in the strange and often unlovely rooms where we're destined to work.

Here's a follow-up to that column.

I do a lot of presentations. For years I was a purist: No slides, no laser-pointers, no sound, just stand up and talk. Though I still follow the stand-up model sometimes—no one wants a luncheon speech accompanied by an AV festival—I've almost completely turned round on using "visuals." Make that "audibles," too.

If you're trying to convey information—and, especially, if you're trying to work a lot of information into a 45-minute talk—the power of letting your audience see your bullet points, photos of things you're talking about, and the faces of the people you're quoting is just too great to forsake.

At the same time, bland, me-too PowerPoint shows using a canned Microsoft template have become too commonplace—and almost always, too boring—to endure. So I design presentations to have some pizzazz, some surprises, some sound bites that both entertain an audience and underscore my points, even if we're talking about something as grim as Y2K catastrophes—or worse, a company's options in the world of ATM.

Of the three kinds, or scales, of presentations I do, the ones at the extremes are no problem. The little ones—one-to-ones, or one-to-threes, across someone's desktop, using the big, bright 14.1-inch display on my current Gateway 9100XL notebook—are easy. Everyone can see the screen, hear me, and understand the ho-hum-quality sound coming from the notebook's built-in speakers.

And presentations in big halls and auditoriums are easy, too—because there's invariably a big Barco or GE video projector or two and a powerful sound system, both set up and operated by techs from the AV firm hired to stage the show. I rely on these production crews, and they invariably make me look and sound better than I deserve.

It's the ones in the middle—presentations in midsize to sometimes very large conference rooms, up through smallish auditoriums and hotel ballrooms—that are a bear. I'm usually on my own, sans production crew. If there's AV equipment installed, or available on request, it rarely

works—or at least, rarely works the way it's *supposed* to. In any case, I don't have half a day to figure out how it's supposed to be set up, what connects to what, and how those damnable remote controls work. Focus on that and I lose focus on what I've been paid to talk about.

I find that an increasing percentage of my presentations are in just such venues: the danger zones. For a couple of years I've been trying to find a tolerably portable kit that lets me show and tell my story in these midsize rooms with great visuals and audio—and without much attention from me.

I've settled on a Road Warrior kit that serves me very well. Not everyone needs a kit this good, or expensive, or heavy, but if you do need something like this, you need it. Besides, even if my system is overkill for your needs, you can steal some tips from my experience with it.

For my projection needs, I've come to rely on Epson's wonderful little 14-pound PowerLite 5000 projector (www.epson.com/corp_prod/projectors/pl5000/). It's small and, within the world of LCD projectors, reasonably light. More important, it's very bright, which means I can throw as large an image onto a screen as I'm ever likely to need in midsize rooms.

The PowerLite 5000 is a native 800-by-600 (SVGA) unit, and because I use a notebook with a 1,024-by-768 (XGA) display, I shopped hard for a unit that could scale down my XGA screens with-

out losing quality. Epson's unit is far and away the best I've seen at this: It doesn't just drop lines but instead truly interpolates 1,024-by-768 down to 800-by-600, retaining very high screen quality even with type smaller than I should use for big-screen presentations.

Just as important is the PowerLite's exceptionally even illumination and sharpness across the projected image. Many color LCD projectors I've used over the years are soft and mushy in the corners, and almost all have a highly visible falloff of light away from the center of the image, which is extremely distracting. Not the PowerLite 5000.

Finally, the PowerLite's small size (about 6 by 10 by 15



A HAPPY MEDIUM

I don't have half a day to figure out how AV equipment is supposed to be set up.

Now

How do you get hundreds of business cards into your PalmPilot?

**Just CardScan.TM
HotSync.TM And GO!**



CardScan business cards into your PC and HotSync into your PalmPilot organizer. It's that simple!

You have a need — to enter hundreds of business cards into your PalmPilot. You also have a problem — you hate typing. Fortunately we have the solution. CardScan Plus 300 scans cards into your PC. The software accurately reads the card and places the name, title, company, address, phone numbers, e-mail address and URL in the appropriate fields. Press HotSync and CardScan fully synchronizes with your PalmPilot.

Just CardScan. HotSync. And GO!

It's that simple.

Buy CardScan Plus 300 today for \$299* and we'll give you 1000 airline miles on your choice of American Airlines, Delta Air Lines, US Airways, Northwest Airlines or United Airlines*.

Call 1-888-795-5556
Offer code: PMMY8FF

CardScan
www.cardscan.com

Offer expires 7/31/98. *U.S. customers please add shipping and handling. **Offer available only through manufacturer. Canadian customers must call for shipping charges. Product only available for U.S. and Canada. HotSync, PalmPilot and the PalmPilot logo are trademarks of 3Com Corporation or its subsidiaries. CardScan is a trademark of Corel Technologies Corp. All other products are trademarks or registered trademarks of their respective holders.



JIM SEYMOUR

inches) has become important in an unexpected way since the FAA's crackdown on carry-on items. Many video projectors I've carried in the past would never meet the under-the-seat-or-in-the-overhead rules so tightly enforced today, but I've never had a quibble from a gate agent about the PowerLite. I also like its long-life lamp. Epson rates it at 2,000 hours, but you couldn't prove that by me: I've never replaced the bulb. (Good thing, since the metal halide lamps cost \$500 each! I carry an extra bulb, and yes, that's very expensive insurance.)

The PowerLite 5000 lists at \$9,300, and you'll probably pay over \$8,000 street price for one. But you'll have the best-of-the-breed portable color projector, with results and reliability I haven't found in competitive units.

For sound, I've recently been carrying a Cambridge SoundWorks Model Twelve, almost unknown to the general public but a longtime hit among traveling musicians and others who want high-quality stereo sound in their hotel rooms. The Model Twelve packs a tiny amplifier and two satellite speakers into a black case that looks like a miniaturized video-camera carrying case; the case itself, closed, is the woofer.

If you've heard any of Cambridge SoundWorks' PC speaker systems or home stereo speakers, you wouldn't be surprised to hear that the Model Twelve produces absolutely knockout sound—and a lot of it. Using a system this good with a notebook PC's noisy line-out signal is overkill, but the results (with my wireless lavalier mike mixed in) are so good that I'm hooked: no more cheap, boomy PA systems or distorted PC speakers driven way beyond their specs.

At \$800 direct from Cambridge SoundWorks (800-367-4434, www.hifi.com), the Cambridge kit isn't cheap; and at 11 pounds and 10 by 17 by 7 inches, the system is heavier and bigger than I'd like. But it's absolutely worth it. Stick a few CDs in your bag and you can have great music playing while you set up, while your audience files in, and in your hotel room at night. Life's too short, etc.

My last tip is MindPath's little Pocket-Point (www.mindpath.com/ppoint.htm). This credit card-size, Carousel-style remote-control "clicker" for PCs also incorporates a bright, sharp laser pointer. The pointer is so small and light that I've nearly lost mine several times. I'm not big on waving a laser pointer around during a presentation, but sometimes it's useful, and with the PocketPoint, the laser pointer comes as a bonus. **PC**

STAPLES

CardScan is available at these and other fine stores and outlets:

COMP USA

McWANE STORE

Fry's

OfficeMax

Best Buy

Micro Center

OfficeMax

OfficeMax

OfficeMax

OfficeMax

Choose 197 at www.pcmag.com/infolink



Insight

Insight continues to win top industry awards as one of the best places to buy computers, hardware and software.



America's discount source for computers, hardware and software

SPRUCE UP THAT SYSTEM

Carrie Alexander
SUPPLIER REIMBURSEMENT ADMINISTRATOR

Bill Harnage
SALES REPRESENTATIVE

Mike Yahyapour
SALES REPRESENTATIVE

Monica Hadley
COLLECTIONS ADMINISTRATOR

Mira Obradovic
ACCOUNT EXECUTIVE

CLEAN UP WITH GREAT SAVINGS AT INSIGHT!

Need multimedia capabilities? Insight won best place to buy multimedia products from Computer Shopper Magazine in 1997.

Need a new hard drive? Insight was the leader in hard drives 9 years running according to Computer Shopper Magazine.

Need the latest software? Insight has incredible prices, and more than 17,000 titles in our Software Cellar.

Need an easy way to get all of this stuff? Insight has an easy to use, award-winning Web site at www.insight.com with access to more than 50,000 products. Don't wait, clean up on hundreds of really great deals at Insight today!

SYSTEM/MONITOR

COMPAQ

'899.00'

Outstanding performance, reliability, and versatility

The Compaq Deskpro 4000S Slimline serves up a 166MHz Pentium® MMX™, 16MB SDRAM, a 2.1GB hard drive and best of all a Compaq V50 15" color monitor!

PRINCETON
GRAPHIC SYSTEMS

'199.00'

A vision statement of quality and value!

The Ultra 51 15" SVGA monitor (13.8" viewable) features 1024 x 768 @ 54Hz resolution, 28mm dot pitch and digital controls — all at one low Insight price.

Includes a Compaq 15" color monitor!

NOTEBOOK



TOSHIBA
In Touch with Tomorrow
Maximize your return on your portable investment
The Satellite Pro 460CDX features a 166MHz Pentium® MMX™ processor, 12.1" FastScan display, 32MB EDO and dazzling 10X multimedia. At this price, it's no wonder Insight is the Toshiba source for corporate America.

PRINTER/STORAGE

'799.00'

HEWLETT-PACKARD

The affordable, high-quality office printing solution

The versatile LaserJet 6Pse features true 600 x 600 dpi resolution, fast 8ppm print speed, 2MB memory, infrared support, with advanced network expandability.

'239.00'

Western Digital

Setting the new standard in performance.

The Caviar 6 4GB Ultra DMA/33 hard drive will help you cruise through applications with blazing 33.3MB/sec max. transfer rates, and quick 9.5ms seek times.

3COM • ADAPTEC • APC • ATI • BELKIN • CISCO • COMPAQ • CREATIVE LABS • HEWLETT-PACKARD • IBM • INFOCUS • INTEL • JONAS • MAG/PRINCETON • MATRIX • MICROSOFT • MICROTEK • MITSUBISHI • PNY • SEAGATE • TARGUS • TOSHIBA • VIEWSONIC • WESTERN DIGITAL

These prices are falling every day — call now for the latest price!

For faster service mention this key code when placing your order: **PMAG**

insight.com
800-INSIGHT

Insight is now in the U.S. and Canada.

Be sure to visit our award-winning Web Site at www.insight.com for access to more than 50,000 products, or call 800-INSIGHT (800/467-4448) for a free catalog.

Prices and availability are subject to change without notice. All trademarks/trademarks are the properties of their respective owners. Photos may not represent actual product. Typographic errors are subject to correction.

Choose 278 at www.pcmag.com/infolink



Crash.



Boom.



Bang.



Click.

A click of a button and you're up and running again.



*From the makers of
PartitionMagic®*

Your hard drive blew up. You lost your tax spreadsheets. Your addresses. That critical business proposal. Not to mention your sanity. You had your whole life contained in a few gigs. Which is why it's a good thing you used Drive Image™ from PowerQuest®. In minutes, you were able to make a complete backup of your hard drive on a Zip®, JAZ®, or almost any other removable media. When disaster struck, you simply reloaded the copy of your hard drive and you were back in business. No hassles. No missing preferences, partitions or passwords. No problems. Just a click of a button and your computer was restored to its exact state before the crash. It's that simple.

And what's more, Drive Image is also:

Easy—A user-friendly interface makes it easy to manage your saved files. And a step-by-step wizard simplifies the backup process.

Fast—Drive Image can now create a compressed image of your hard drive up to five times faster than before. Plus, with its patent-pending SmartSector™ technology, Drive Image can copy significantly faster than traditional backup methods.

Safe—Drive Image now features ImageShield™ password protection and encryption to protect critical information. It also automatically checks disk integrity and looks for bad sectors to prevent data loss from occurring.

Flexible—You can quickly restore your whole hard drive or recover individually selected files. Drive Image also allows you to "span" across removable media, such as Zip®, JAZ®, and SyQuest® drives.

Now, restoring your hard drive is as easy as blowing it up.

For more information about Drive Image, or to learn about additional licensing options, call 1-800-379-2566.

Get \$15 cash back from PowerQuest.

Ask your reseller for details.

© 1998 PowerQuest Corporation. All rights reserved. PowerQuest is a registered trademark of PowerQuest Corporation. Drive Image, SmartSector and ImageShield are trademarks of PowerQuest Corporation. U.S. Patents 5,675,769 and 5,706,472. Other patents pending.

www.powerquest.com
Choose 176 at www.pcmag.com/infolink



Avoiding Clueless E-Mail

The electronic mail message from a PR rep for Digital ran 4-plus megabytes and started off, "I'd like to take the opportunity to set the record straight and explain to you—clearly and concisely [sic]—the real impact of the Intel agreement...." Reading that,

I thought: "Help! I've fallen into e-mail hell and I can't get out." Is it just me, or do you, too, have problems with people sending unsolicited 4.6MB e-mail messages—let alone with the semantic issue of calling such a message "concise"?

For many of us, electronic mail and its offshoots—such as online group discussions and calendaring—have supplanted word processing as the most common use of our PCs. Given that situation, it's time to revisit the issue of e-mail etiquette. After all, if you use e-mail indifferently, your career could suffer. Here are 11 rules for getting the most from e-mail.

1. Keep it short. If it's important or if it's going up the ladder to someone who gets a lot of e-mail, definitely keep it short. The header plus the message should be visible—all of it—on one SVGA screen.

2. Create multiple versions. Include a long version for people who require all the information and another for the majority who need just top lines. Offer to e-mail the longer version on request.

3. Lay off the colored fonts and clip art. In a lot of companies, the support departments are the worst offenders, and that makes you wonder if they have too much free time on their hands. Or if they really think a dull memo about updating your salary withholdings will be more memorable with 14-point bold red type and clip art of a perspiring gent in a 1950s business suit looking at a clock approaching midnight.

4. Don't be in a rush to respond. If the issue is touchy or if you're annoyed, write the message now but save it as a draft for an hour or overnight. When you go back, you'll probably find (a) you were overly emotional, (b) it doesn't make sense, (c) you misspelled some words, (d) you wrote too much, and (e) you still forgot two of your key points.

5. Is this response really necessary? Let the other guy have the last word. If the boss sends out a memo telling a team member, "Good job," does everyone need to respond to all and say, "I agree"? If you must, send the attaboy privately.

6. Do your homework, then respond. If you get a memo asking whether you're free for a meeting on Tuesday the 26th at 11:00 A.M., instead of e-mailing a note that says "Let me check and I'll get back to you," check first and then e-mail back your confirmation.

7. Tell the story in the subject line.

E-mail arrives in which the subject line says "press release," "meeting," "following up," or "checking in," or is blank. That leaves one clueless. Also make sure the subject line works for both sender and receiver. If your entire business is making engine-mounting bolts for the Boeing 757, sending a note that reads "Specs update" might be clear to you, but it wouldn't mean a thing at the receiving end to the Boeing purchasing agent who buys several hundred parts.

8. Get a personal e-mail account, too.

Say, did you hear the one about the blonde from Dallas who...? Using company e-mail to send jokes, your resume, or snippy comments about the boss carries the slight but real risk somebody will read your mail and get you into trouble.

9. Assume that you'll wind up in court.

Once created, most e-mail systems save even deleted messages. Be careful about what you say or promise.

10. Fight the good fight with IS. It's never clear whether IS people want to make things better for you or easier for themselves. (I'm sure Scott Adams had real IS people as models for the Dilbert characters.) For instance, most good mail

systems can be customized, and there's no reason your company can't have front ends for both power and casual users. Right now, there's a skirmish within our company, because IS dumbed down the latest release of Notes to make it harder for users to do stupid things. Turns out all this does is slow down the power users, while the nitwits still find a way to overload the outbound gateways or use respond-to-all for every mailing.

11. Handwrite important personal notes. Since we use e-mail so much, the impact soars for the occasional, personal handwritten note. Lay in a stock of good notecards. They may cost \$1 apiece, but they're well worth the investment. **PC**



FOR EVERYONE
There's no
reason your
company can't
have front ends
for power and
casual users.

We at ProGen

ProGen is a leading provider of computer systems and services. We are committed to providing the highest quality products and services to our customers. Our systems are designed to meet the needs of businesses of all sizes. We offer a wide range of products, including desktop computers, laptops, and servers. Our services include system integration, consulting, and training. We are proud to be a part of the ProGen family and to provide the best possible experience for our customers.

ProGen is a leading provider of computer systems and services. We are committed to providing the highest quality products and services to our customers. Our systems are designed to meet the needs of businesses of all sizes. We offer a wide range of products, including desktop computers, laptops, and servers. Our services include system integration, consulting, and training. We are proud to be a part of the ProGen family and to provide the best possible experience for our customers.



Looking for stell down to earth



Polaris

solution

Common features: 512KB integrated L2 Cache, 56K Telephony Modem, A3D PCI 32 bit 3D Stereo Wavetable Audio Subsystem, 1.44MB FDD, 2 Universal Serial Bus (USB) Ports, Super CD Bonus Pak, Microphone w/Stand, ProGen ProCare Warranty: 3-Year Limited Parts + 1-Year On-Site

300MHz

Intel Pentium® II Processor

- Intel 440LX AGP Chipset
- Support DMI v.2.0
- Intel LANDesk® Client Manager v.3.1
- 32MB SDRAM
- 4.3GB Ultra DMA Hard Drive
- ProGen 15" .28dp Digital PnP Monitor
- Matrox Productiva G100 AGP Graphics Card, 4MB SGRAM
- 24X CD-ROM Drive
- Amplified Stereo Speakers (Add a Subwoofer for \$39)
- Microsoft IntelliMouse
- Microsoft Natural Keyboard Elite
- MS Windows 95
- Microsoft Office 97 Small Business Edition

\$1479

333MHz

Intel Pentium® II Processor

- Intel 440LX AGP Chipset
- Support DMI v.2.0
- Intel LANDesk® Client Manager v.3.1
- 64MB SDRAM
- 6.4GB Ultra DMA Hard Drive
- ProGen 17" Digital PnP Monitor
- Matrox Productiva G100 AGP Graphics Card, 4MB SGRAM
- NEW! 32X CD-ROM Drive
- Subwoofer Sound System w/Amplified Stereo Speakers
- Microsoft IntelliMouse
- Microsoft Natural Keyboard Elite
- MS Windows 95
- Microsoft Office 97 Small Business Edition

\$1899

350MHz

Intel Pentium® II Processor

- Intel 440BX AGP Chipset
- Support DMI v.2.0
- Intel LANDesk® Client Manager v.3.1
- 64MB SDRAM
- 8.4GB Ultra DMA Hard Drive
- Panasonic 17" (16" v.i.s.).27dp Digital PnP Monitor
- Matrox Productiva G100 AGP Graphics Card, 8MB SGRAM
- NEW! 32X CD-ROM Drive
- Iomega Zip 100MB Internal Drive w/One Cartridge
- Subwoofer Sound System w/Amplified Stereo Speakers
- Microsoft IntelliMouse
- Microsoft Natural Keyboard Elite
- MS Windows NT Workstation v.4.0
- Microsoft Office 97 Small Business Edition

\$2399

400MHz

Intel Pentium® II Processor

- Intel 440BX AGP Chipset
- Support DMI v.2.0
- Intel LANDesk® Client Manager v.3.1
- 64MB SDRAM
- 8.4GB Ultra DMA Hard Drive
- 19" (18" v.i.s.).26dp Digital PnP Monitor
- Matrox Productiva G100 AGP Graphics Card, 8MB SGRAM
- NEW! 32X CD-ROM Drive
- Subwoofer Sound System w/Amplified Stereo Speakers
- Microsoft IntelliMouse
- Microsoft Natural Keyboard Elite
- MS Windows 95
- Microsoft Office 97 Small Business Edition

\$2699

*Desktop Camera, Video Capture, Motion Video - Add \$185 *Upgrade from MS Windows 95 to MS Windows NT Workstation v.4.0 - Add \$95

*Upgrade to 11.5GB Hard Disk - Please Call!

ar performance at a price? Look to ProGen.

Immediate delivery! Discover

- 256K Pipelined Burst Cache
- 32MB EDO DRAM
- 3.2 GB Hard Drive
- 2MB Video Graphic Card
- ProGen 14" .28dp Monitor
- 24X EIDE CD-ROM Drive/1.44MB FDD
- 33.6K Telephony Modem,
- 3D Stereo Wavetable Audio Subsystem, complete with Amplified Stereo Speakers
- MS Windows 95
- Win95 Keyboard/Hi-Res Mouse
- ProGen 1-year Limited Parts/Labor Warranty

200MHz \$779
Intel Pentium® Processor with MMX™ Technology

Multimedia value solution. Discover 3D

- 512K Pipelined Burst Cache
- 3.2 GB Hard Drive
- ProGen 15" .28dp Digital PnP Monitor
- 24X EIDE CD-ROM Drive/1.44MB FDD
- 56K Telephony Modem
- 3D Stereo Wavetable Audio Subsystem, complete with Amplified Stereo Speakers (Add a Subwoofer for \$39)
- MS Windows 95/MS IntelliMouse
- Microsoft Natural Keyboard Elite
- Super CD Bonus Pak, Microphone w/ Stand
- ProGen ProCare Warranty (3-Year Limited Parts + 1-Year On-Site)

- Intel 440LX AGPset
- 32MB SDRAM
- AGP Video Graphic Card, 4MB SGRAM

266MHz \$1099
Intel Pentium® II Processor

233MHz \$1049
Intel Pentium® II Processor

- 32MB EDO DRAM
- ProGen Gold 3D (53 Virge) 4MB EDO DRAM, MPEG

233MHz \$929
Intel Pentium® Processor with MMX™ Technology

solution
ProGen Notebook Series

Common features 13.3" TFT XGA Active Matrix Display, Intel Mobile Module with 512K L2 Cache Running at 1.8V, Intel 430TX Mobile PCI Chipset, PCI Bus with 64-bit 3D Graphic Accelerator 4MB SGRAM, Max 20X CD-ROM Drive, Built-in 56K Fax/Modem, Expandable to 128MB SO DIMM, 16-bit SoundBlaster Pro Compatible Stereo sound (supports 3D sound and wavetable), Built-in Stereo Speakers and Microphone, Infrared Module (including Utility) Supports FIR, CardBus and Zoomed Video Ready, NTSC-video Output, Built-in 3.5" FDD, 2 Type II or 1 Type III PCMCIA Slot, Smart Lithium-Ion Battery/AC Adapter, Mobile Car Adapter/Carrying Case/Touch Pad, Microsoft Windows 95, 1 Year Limited Parts and Labor Warranty



We're slashing prices on ProGen Notebook Series. Get the most in performance for less than ever before.

ProGen Notebook Series expands the horizons of portability and convenience with the power of the latest Intel Mobile Module 266MHz Pentium® Processor with MMX™ Technology. • The Intel Mobile Module, with internal 512K L2 Cache, running at 1.8V, significantly reduces power consumption, lengthens battery life and speeds performance dramatically. And with our smart lithium-ion battery and big 13.3" TFT screen, you'll have plenty of time and space to enjoy it all.



Upgrade options

- Port Replicator **\$ 59**
- AC Adapter **\$ 59**
- Additional Lithium-Ion Battery (with system purchase) **\$199**

233MHz Intel Pentium® Processor with MMX™ Technology, 1.8V

- 13.3" TFT XGA Active Matrix Display, 3GB HDD, 32MB EDO SO DIMM, Built-in 56K bps Fax/Modem

\$2349

- 13.3" TFT XGA Active Matrix Display, 4GB HDD, 64MB EDO SO DIMM, PCMCIA 10BaseT Ethernet Card, Built-in 56K bps Fax/Modem

\$2679

266MHz Intel Pentium® Processor with MMX™ Technology, 1.8V

- 13.3" TFT XGA Active Matrix Display, 3GB HDD, 32MB EDO SO DIMM, Built-in 56K bps Fax/Modem

\$2449

- 13.3" TFT XGA Active Matrix Display, 4GB HDD, 64MB EDO SO DIMM, PCMCIA 10BaseT Ethernet Card, Built-in 56K bps Fax/Modem

\$2799

1-800-848-1353

Sales Hours: M-F, 6:30 A.M. - 7:00 P.M. PST • Sat, 9:00 A.M. - 3:00 P.M. PST

Technical Support: 1-888-777-5501 • Customer Service: 1-800-848-8767

Customer Service/Technical Support Hours: M-F, 8:00 A.M. - 5:00 P.M. PST

ProGen™ Technology Inc. 15501 Redhill Avenue, Tustin, CA 92780 Ph: 714/566-9200 Fax: 714/566-9267
BBS: 714/566-9255 E-Mail: webmaster@progen.com

©1998 ProGen™ Technology Inc. Intel Inside logo, Pentium and LANDesk are registered trademarks and MMX is a trademark of Intel Corporation. All other trademarks are the property of their respective owners. Prices are subject to change without notice. *On site service is based on the discretion of ProGen technical support. Leasing Rate will vary depending on state legislation, and is intended for business or corporate use only. 30-day money-back Guarantee (shipping cost not included). Actual products may be different from products in photo. *ProGen ProCare Warranty is for desktop systems only. *Maximum transmission speed of up to 56K bps when downloading data and 33.6K bps when uploading. However, actual performance is dependent upon numerous factors and observed transfer rates may be less than the maximum potentials. ProGen is not responsible for typographical errors.

ProGen™
A Division of ProGen Technology, Inc.

Works for You.
www.progen.com

Choose 287 at www.pcmag.com/infolink



400 MHz Pentium II PCs

Setting the new standard in high-end PC performance, the third generation of Pentium II systems has arrived, offering clock speeds of 350 to 400 MHz and marking the debut of a 100-MHz system bus. Faster CPUs are nothing new, and these systems won't offer the performance boost that a Pentium II did over the classic Pentium. But instead

of putting a premium price on the new chips, Intel and system vendors have made them surprisingly affordable. There's no need to wait to get the best: It's here now, and it won't strain your wallet.

PC Labs tests the first nine 400-MHz Pentium II systems, which feature Intel's latest chip set, the BX, and mark the debut of the new 100-MHz system bus.

By Michael Slater

IN THIS REVIEW

Acer America Corp.....	108	Quantex Microsystems Inc.	130
Compaq Computer Corp.....	116	Sys Technology Inc.	130
Dell Computer Corp.	116	Price/Performance Index.....	104
Gateway 2000 Inc.	125	CPU Comparison Chart.....	106
Hewlett-Packard Co.	125	Vendor Service and Reliability.....	108
Micron Electronics Inc.	128	Performance Tests.....	120
NEC Computer Systems Division.....	128	Summary of Features.....	124

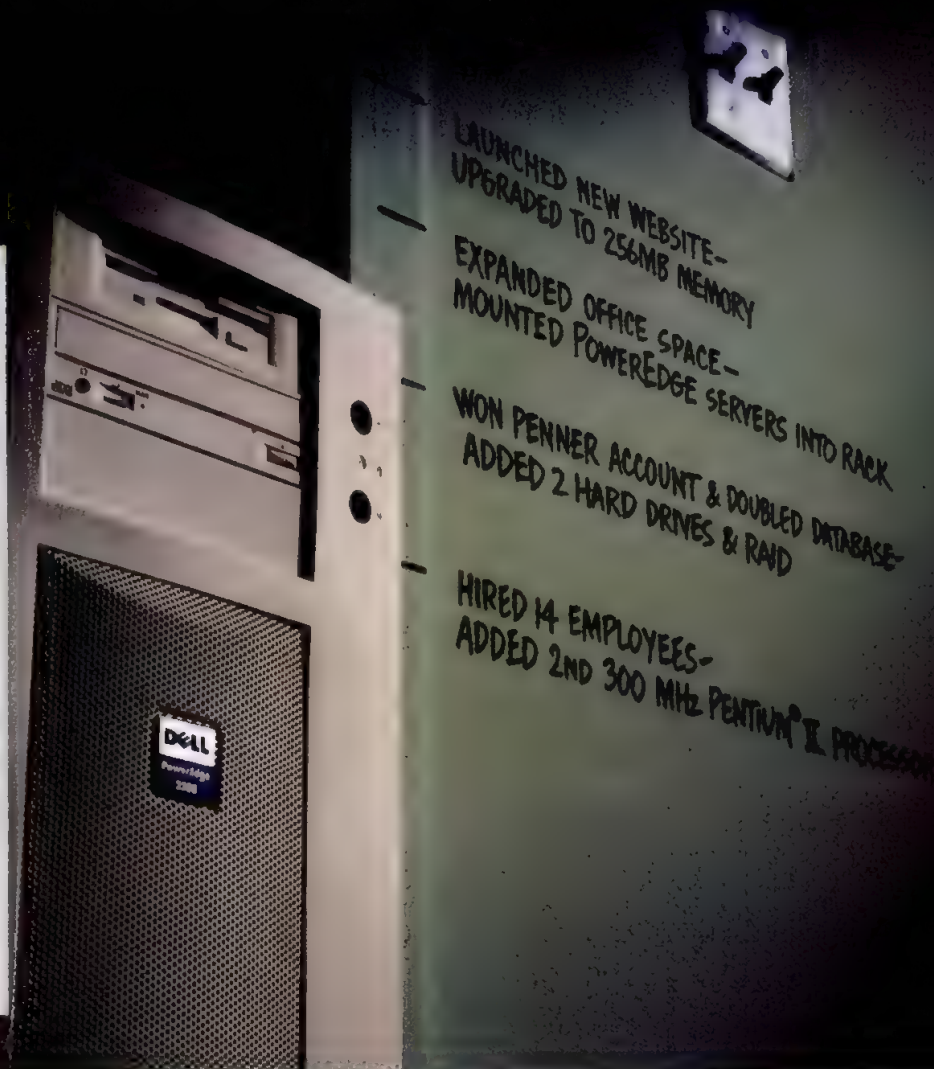
GROWTH HAPPENS. MANAGE IT.

DELL® POWEREDGE® 2200 SERVER NEW 333MHz PENTIUM® II PROCESSOR Dual Processor/RAID Capable Workgroup Server

- 128MB ECC EDO Memory
- 512KB Integrated L2 ECC Cache
- Integrated PCI Ultra-Wide SCSI-3 Controller
- ★ 9GB Ultra-Wide SCSI-3 Hard Drive (7200 rpm)
- 24X Max⁴ Variable SCSI CD-ROM Drive
- Intel Pro/100B PCI Ethernet Adapter
- ★ APC Smart-UPS 700 Power Supply
- HP® OpenView™ NNM Special Edition
- 6 Expansion Slots: 3 PCI/3 EISA
- 6 Drive Bays: 3 External 5.25"/3 Internal 3.5"
- ★ 3-Year Next-Business-Day On-site⁴ Service
- 7x24 Dedicated Server Hardware Technical Telephone Support
- ★ 2nd 333MHz Pentium II Processor, add \$999
- ★ Add a 9GB Ultra-Wide SCSI-3 Hard Drive, \$899.
- ★ 12/24GB Variable SCSI DAT Tape Backup Unit, add \$849

\$3999

Business Lease: \$147/Mo., 36 Mos.
Order Code #250124



THE DELL POWEREDGE 2200 SERVER. NOW WITH 333MHz FOR YOUR GROWING BUSINESS.

Do your PC capabilities measure up to your company's growing needs? Then take a look at the Dell® PowerEdge® 2200 server, the feature-rich server with the perfect mix of performance and expandability, that can be yours for one of the best prices in the industry. Relevant technology like dual Pentium® II processor capability, ECC EDO memory and an optional RAID feature delivers outstanding performance in its workgroup class. And our service offering includes three years of next-business-day on-site⁴ service and lifetime 7x24 server hardware technical telephone support. So give us a call or visit our website today. With the PowerEdge 2200 server on your team, managing growth won't be such a stretch.



DELL®

TO ORDER TOLL-FREE

800-437-0182

TO ORDER ONLINE 24 HRS./DAY

www.dell.com/buydell

Mon-Fri 7am-9pm CT • Sat 10am-6pm CT
Sun 12pm-5pm CT • In Canada* call 800-233-0702
GSA Contract #GS-35F-4076D

Keycode #04710

For a complete copy of Guarantees or Limited Warranties please write Dell USA L.P. Attn: Warranties One Dell Way, Round Rock, TX 78662. *Business leasing arranged by Dell Financial Services, an independent entity to qualified customers. Above lease payments based on 36-month lease, and do not include taxes, fees, shipping charges; subject to credit approval and availability. Above lease terms subject to change without notice. ⁴On-site service guarantee provided pursuant to a service contract with a third-party provider. May not be available in remote areas. ²24X Max/¹2X Min. *Prices and specifications valid in the U.S. only and subject to change without notice. The Intel Inside logo and Pentium are registered trademarks and MMX is a trademark of Intel Corporation. IMS and Windows NT are registered trademarks of Microsoft Corporation. HP is a registered trademark and OpenView is a trademark of the Hewlett Packard Company. Dell, the Dell logo and PowerEdge are registered trademarks of Dell Computer Corporation. ©1998 Dell Computer Corporation. All rights reserved.

Editors' Choice

• Gateway G6-400



These new Pentium II/400 PCs are remarkable not only for speed but for price as well. Our Editors' Choice

winner, the Gateway G6-400 (\$2,954 direct), is a perfect example. The Gateway G6-400 comes with all the features you could want: an STB Velocity 128 AGP card, SDRAM, a 17-inch MAG monitor, a 9.6GB ATA-4 IBM hard disk, and a Toshiba DVD drive—all for under \$3,000. The system also boasts terrific PCI-based Ensoniq audio, complemented by Boston Acoustic speakers with subwoofer as well as hardware-based DVD

and MPEG-2 decoding, and good DVD playback quality. All of these components added up to great performance across our tests. Gateway rounds out this offering with Microsoft Office 97 Small Business Edition. The unit has a three-year parts and labor warranty—slightly better than most—and one year of on-site service and 24-hour toll-free technical support.

We also give an honorable mention to the Quantex QP6/400 SM-4x (\$2,649 direct). Though not as fast as some of the other products we tested, the Quantex system is more than fast enough to do the job and is a very good deal for the price. It comes with an 8GB IBM ATA-3 hard disk, a Diamond Fire GL1000 Pro AGP graphics card, and a 19-inch monitor. You also get an Ensoniq PCI sound card, Altec Lansing speakers with subwoofer, and a 32X CD-ROM drive.

Quantex offers Microsoft Office Small Business Edition and around-the-clock toll-free technical support with the unit.

REVIEW CRITERIA

For this roundup, we sought the first Pentium II PCs based on the new BX chip set, using either the 400-MHz or 350-MHz CPU; all the systems tested used the 400-MHz unit.

www.pcmag.com

Please join us online for an interactive look at each of the first nine 400-MHz Pentium II systems with the BX chip set and the 100-MHz memory bus.

Systems had to come with 64MB of RAM, a 4GB hard disk or better, a 17-inch monitor or better, graphics cards capable of 1,024-by-768 resolution, a modem, basic audio, and Microsoft Windows 95. We allowed either a DVD drive or CD-ROM drive.

We received nine systems, from Acer America, Compaq Computer Corp., Dell Computer Corp., Gateway 2000, Hewlett-Packard Co., Micron Electronics, NEC Computer Systems Division, Quantex Microsystems, and Sys Technology.

Some vendors were not able to get us a product in time for this feature. They include AST Computers, Digital Equipment Corp., DTK Computers, Everex Systems, IBM Corp., and MidWest Micro. Toshiba America chose not to participate.

PERFORMANCE

Because all tested systems are based on the same processor, most of the performance differences you'll observe among them come from differences in the graphics or disk subsystems. In general, we found that systems with 7,200-rpm hard disks and

nVidia RIVA 128-based graphics performed best. Our top performer, however, the Sys Performance Pro 400B4DDD, used both a Matrox Millennium II AGP graphics card and a Diamond Multimedia Monster 3D II add-on card to achieve the best 2-D and 3-D graphics performance.

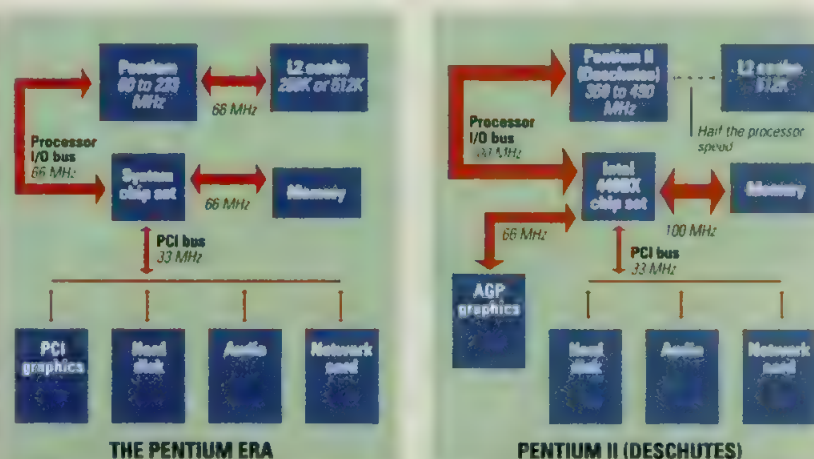
To provide an overview of performance differences among the top processors currently available, we also took an informal look at representative 350-MHz and 333-MHz systems and compared them with the 400-MHz systems in this roundup. When moving from 350 to 400 MHz, each CPU on a 100-MHz bus, the 14 percent clock speed increase yielded only a 6 to 10

percent increase on our benchmark tests with the exception of CPUmark32, which showed the full 14 percent benefit. Across the full range from 333 to 400 MHz, the performance difference on ZD Business Winstone 98 was about 12 percent, and each of the other benchmark tests showed a gain of less than 20 percent.

Compared with a 333-MHz system, a 350-MHz Pentium II is a mere 5 percent higher in clock speed. Because the percentage clock-speed increases are modest, so is the net performance gain. The 350-MHz system has a 50 percent faster system bus and main memory, however, so the boost is actually greater than the

Evolution of a Processor Platform

With the BX chip set, Intel introduces the first major advance in processor bus speed since the Pentium's debut in 1993—from 66 to 100 MHz.



Price/Performance Index: 400-MHz Pentium II PCs

Make no mistake: All of these 400-MHz Pentium II units offer stunning processing power. All the PCs start with the same type of basic platform—including AGP graphics, 64MB of SDRAM, and Intel 440BX PCI chip sets—the peripherals added by the vendors made the difference.

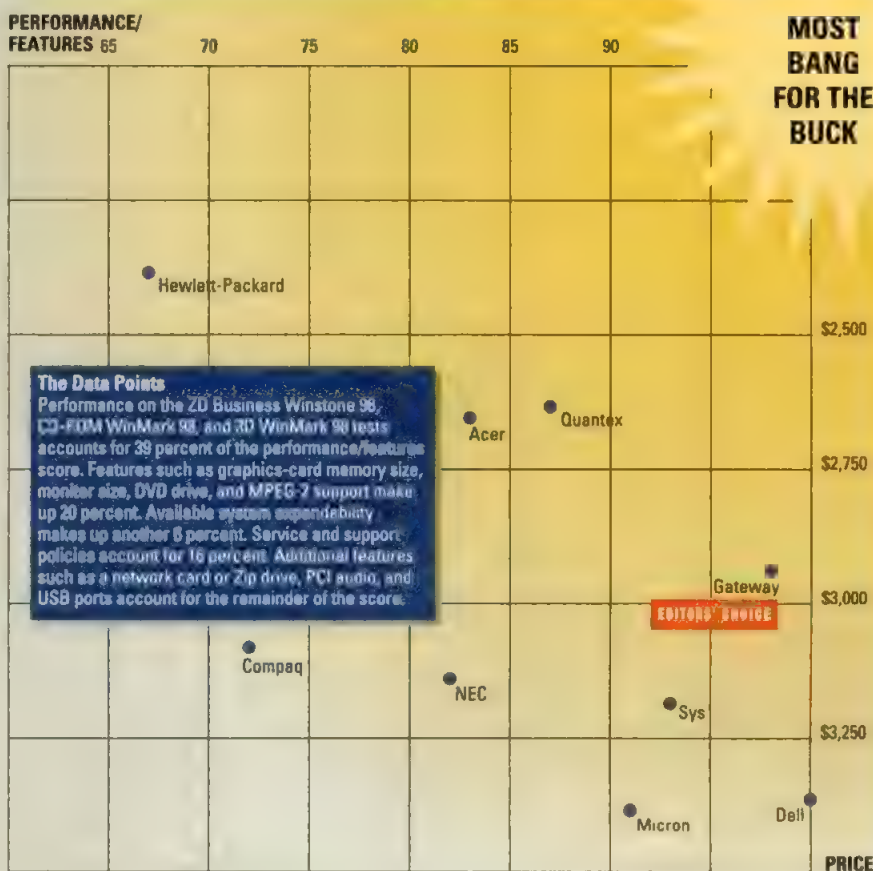
Although the Quantex QP6/400 SM-4x (\$2,649 direct) is not a performance leader, the unit, which comes with a 19-inch monitor, provides the best balance of muscle and price. It includes an admirable audio and software bundle.

Ahead of the Quantex system in performance—and higher in price—is the Dell Dimension XPS R400 (\$3,229 direct). The unit's 13.7GB IBM Deskstar hard disk and unique device driver produced an extraordinarily high score on our ZD Business Disk WinMark 98 tests. Although the device driver doesn't have as much weight with mainstream application performance, the unit's Winstone score and its results on our other tests were very good. The unit also boasts a DVD drive.

Our Editors' Choice, the Gateway G6-400 (\$2,954 direct) almost matches the Dell Dimension XPS R400 in features (the G6-400 has a 9.6GB disk capacity versus the R400's 13.7GB). And the G6-400's performance is nearly

the same as the R400's—at a lower price.

The least expensive system, the HP Brio 8532 (\$2,400 street), uses a slow, motherboard-integrated AGP graphics solution and a slow disk, both of which hampered its performance.—*Analysis written by Robert S. Anthony*



CPU clock-speed increase.

We compared identically configured PCs, one running at 350 MHz with a 100-MHz bus, the other running at 333 MHz with a 66-MHz bus. The 350-MHz PC pulled ahead by around 6 percent on Business Winstone 98, CPUmark₃₂, and 3D WinMark and by more than 10 percent on Business Graphics WinMark. Applications that work with large data sets—which draw upon memory more heavily—could show an even greater benefit.

CPU pricing in quantities of 1,000 roughly follows the performance gains: a 400-MHz chip is \$824, a 350-MHz model is \$621, and a 333-MHz unit is \$583. That translates into top-of-the-line PCs priced below \$3,000, as opposed to the \$4,000 or more we have seen in the past.

THE 100-MHz BUS

The tested systems are based on the new 0.25-micron version of the Pentium II and Intel's 440BX system-logic chip set. Aside

from the higher CPU speeds, the most significant change in these new PCs is a shift from a 66-MHz system bus to a 100-MHz bus. It is the fastest bus to appear in any PC, and this is the first time Intel has increased bus speed since the debut of the Pentium in 1993. (Prior to that, 486 systems ran on a 33-MHz bus.)

The major benefit of the 100-MHz bus in Pentium II PCs is that it provides 50 percent more bandwidth to memory. Each Pentium II system with either 350 or 400 MHz will have a 100-MHz system bus and require 100-MHz-compatible SDRAM. Socket 7 (Pentium-compatible) PCs will also move to 100 MHz later this year, and in these systems it will make more of a dif-

Our Contributors: MICHAEL SLATER is the editorial director of *Microprocessor Report*. ROBERT S. ANTHONY and CADE METZ are senior writers at *PC Magazine*. ANGELA TUKA is a researcher at *PC Magazine*. RICHARD FISCO was the project leader, and ANUSH YEGYAZARIAN was the associate editor in charge of this story.

INTRODUCING A WHOLE NEW

The Sun™ Ultra™ 5 and Ultra 10 workstations. They're an evolutionary leap over all lower forms of workstations.

Because they're full-fledged Sun workstations (with up to a 300MHz processor, no less)

that'll run all your favorite PC apps while delivering the power, scalability, networkability,

and robust UltraSPARC™/Solaris™ performance you've come to expect from Sun. And all

starting at \$3,895.* (Roughly 13% less than a comparably equipped Compaq® system!)

With these workstations, you can run heavy-duty applications one moment, then craft presenta-

tions using Microsoft® Office® the next. What's more, the Ultra 10 with its Elite3D graphics blows away a similar

SGL machine. And at less than *a third* of the cost.** And since both Sun models are binary compatible, they'll

run over 12,000 applications available for Sun. (And now every PC application beneath it.) All of which just may

make them the missing links you've been looking for. For more information, call 800-SUN-FIND for a Sun reseller

or representative near you. Or visit our Web site at sun.com/ult/pmg. THE NETWORK IS THE COMPUTER.™

Choose 335 at www.pcmag.com/Infolink



SPECIES OF WORKSTATION.

Pricing based on MSRP as of 2/98. Certain models not available for Web purchase. *Ultra 5 with 17" monitor only. **Compaq PW6000 with Pentium® 266MHz processor, 64MB/4GB with a 17" monitor. ***Silicon Graphics® Octane™ R10000 250MHz, 128MB/4GB system. ©1998 Sun Microsystems, Inc. All rights reserved. Sun, Sun Microsystems, the Sun Logo, Solaris, Ultra and The Network Is The Computer are trademarks or registered trademarks of Sun Microsystems, Inc. in the United States and other countries. All SPARC trademarks are used under license and are trademarks or registered trademarks of SPARC International, Inc. in the United States and other countries. Products bearing SPARC trademarks are based upon an architecture developed by Sun Microsystems, Inc. Other trademarks are the property of their respective owners.

CPU Comparison

Below we list some past, current, and future processors, along with their basic features

Processor	Introduced	Clock speeds (MHz)	System bus speed (MHz)	L1 cache	Integrated L2 cache
Intel 386	October 17, 1985	16, 20, 25, 33	Speed of processor	None	None
Intel 486	April 10, 1989	25, 33, 50, 66, 75, 100	25, 33, 50	8K, 16K	None
Intel classic Pentium	March 22, 1993	60, 66, 75, 90, 100, 120, 133, 150, 166, 200	50, 60, 66	16K	None
Intel Pentium Pro	November 1, 1995	150, 166, 180, 200	60, 66	16K	256K, 512K, 1MB
Intel Pentium with MMX Technology	January 8, 1997	166, 200, 233	66	32K	None
Intel Pentium II (Klamath)	May 7, 1997	233, 266, 300	66	32K	512K (off-chip but in SEC cartridge)
Intel Pentium II, 66-MHz bus (Deschutes)	January 26, 1998	333	66	32K	512K (off-chip but in SEC cartridge)
Intel Pentium II, 100-MHz bus (Deschutes)	April 15, 1998	350, 400	100	32K	512K (off-chip but in SEC cartridge)
Intel Celeron	April 15, 1998	266	66	32K	None
Intel Slot 2 processor (for workstations and servers)	First half of 1998 ¹	Unknown	100	Unknown	Up to 2MB
AMD K6	April 2, 1997	166, 200, 233, 266	66	64K	None
AMD K6 3D	First half of 1998 ¹	300, 350	66, 100	64K	None
AMD K6+ 3D	Second half of 1998 ¹	350, 400	66, 100	64K	256K
Cyrix 6x86	February 5, 1996	133 (PR 166), 150 (PR 200)	60, 66, 75	16K	None
Cyrix MediaGX	February 20, 1997	133, 150, 180, 233	66	16K	None
Cyrix 6x86MX	May 30, 1997	150 (PR 166), 166 (PR 200), 188 (PR 233), 208 (PR 266) (PR300 and PR350 available in the first half of 1998)	60, 66, 75, 83 (100 available in the first half of 1998)	64K	None
Cyrix MXi	Second half of 1998 ¹	PR300, PR400	133	64K	None
IDT WinChip	October 13, 1997	180, 200 (220 and 240 available in the first half of 1998)	60, 66	64K	None
IDT C6+	First half of 1998 ¹	300	66, 75, 100	64K	None
IDT C6+ with L2 cache	Second half of 1998 ¹	300	66, 100	64K	256K

N/A—Not applicable. Neither the processor nor its chip set supports L2 cache. (1) Projected. (2) With sound, graphics, and memory controllers integrated. (3) In the 233-MHz version. (4) In the 300- and 350-MHz versions.

ference than in Slot 1 systems (Pentium II-compatible, housed in a cartridge) because the faster bus will also deliver a 50 percent boost in L2 cache bandwidth.

The CPU in a Pentium II module has a private connection to L2 cache that does not leave the module. This bus operates at half the processor clock speed. Because the L2 cache is connected via this special bus, it isn't affected by the system bus speed. In Socket 7 CPUs, the L2 cache shares the system-bus bandwidth with main memory and I/O and is limited to 66 MHz (75 MHz in some non-Intel PCs). Thus the increase in the system bus speed is not as important for a Pentium II CPU as it is for a Socket 7 processor.

A side effect of the 100-MHz bus is a shift from the 33-MHz increments in clock speed that have driven the industry for so long to 50-MHz increments. This welcome change is due to the way the CPU clock is generated: It is a multiple of the bus speed, in half-step increments. The larger increment gives round numbers for clock speeds and helps maintain a similar percentage increase.

PROLIFERATING PENTIUM II

Intel plans to proliferate Pentium II processors widely this year, moving both up and down in performance, from 450-MHz systems to the new Celeron processors.

The 400-MHz systems with their 100-

MHz bus will be the performance-driven buyers' choice for most of this year, with 450-MHz systems appearing late in the year and offering a performance boost of another few percent.

Systems with a 66-MHz bus will not go away soon, however. As the tests show, the performance difference from the bus speed is not that great for most applications. Intel will continue with the 66-MHz bus for processors in the 233- to 333-MHz speed range. Systems using these chips will be the best choice for PC purchasers looking for good performance at a value price.

To move the Pentium II processor into the least expensive systems, Intel has introduced a new product line called *Celeron*.

Speed of L2 cache interface (MHz)	Special extensions	Process technology	Packaging
N/A	None	1 μ BiCMOS	Pin-grid array
Speed of system bus	None	1 μ , 0.8 μ BiCMOS	Pin-grid array
Speed of system bus	None	0.8 μ , 0.6 μ , 0.35 μ BiCMOS	Pin-grid array (Socket 5- and Socket 7-compatible)
Speed of processor	None	0.6 μ , 0.35 μ BiCMOS	Dual-cavity-pin grid array (Socket 8-compatible)
Speed of system bus	MMX	0.35 μ CMOS	Pin-grid array (Socket 7-compatible)
Half the speed of the processor	MMX	0.35 μ CMOS	Single-edge-contact cartridge (Slot 1-compatible)
Half the speed of the processor	MMX	0.25 μ CMOS	Single-edge-contact cartridge (Slot 1-compatible)
Half the speed of the processor	MMX	0.25 μ CMOS	Single-edge-contact cartridge (Slot 1-compatible)
N/A	MMX	0.25 μ CMOS	Single-edge processor package (Slot 1-compatible)
Speed of processor	MMX	0.25 μ CMOS	Unknown
Speed of system bus	Licensed MMX	0.35 μ , 0.25 μ CMOS	Pin-grid array (Socket 7-compatible)
Speed of system bus	Licensed MMX, 3-D	0.25 μ CMOS	Pin-grid array (Socket 7-compatible)
Speed of processor	Licensed MMX, 3-D	0.25 μ CMOS	Pin-grid array (Socket 7-compatible)
Speed of system bus	None	0.35 μ CMOS	Pin-grid array (Socket 7-compatible)
N/A	MediaGX ² , MMX ³	0.35 μ CMOS	Ball-grid array
Speed of system bus	MMX, 3-D ⁴	0.35 μ , 0.25 μ CMOS	Pin-grid array (Socket 7-compatible)
Speed of system bus	MMX, 3-D	0.25 μ CMOS	Pin-grid array (Socket 7-compatible)
Speed of system bus	MMX	0.35 μ CMOS	Pin-grid array (Socket 7-compatible)
Speed of system bus	MMX, 3-D	0.25 μ CMOS	Pin-grid array (Socket 7-compatible)
Speed of processor	MMX, 3-D	0.25 μ CMOS	Pin-grid array (Socket 7-compatible)

The initial Celeron processor, previously known by the code name Covington, is the same Deschutes processor as in the Pentium II but mounted in a lower-cost module that has no L2 cache. The lack of the cache will reduce performance significantly, making this CPU attractive only to the most cost-focused buyers.

We believe systems based on a 266-MHz Celeron processor will be slower on most applications than a good 233-MHz Pentium MMX system, not to mention a 266-MHz AMD K6 or Cyrix 6x86MX system. The Celeron will fare better on applications that make heavy use of floating-point or MMX functions, but such applications are few and far between.

The Celeron line will become much more interesting with the debut of the processor, code-named *Mendocino*, later this year. Mendocino will include 128K of on-chip L2 cache running at the full CPU speed. This cache is only a quarter the size of the L2 cache in a Pentium II module but is twice as fast. For applications with high hit rates in the 128K cache, Mendocino could be faster than Pentium II at the same clock speed, but for most applications it probably will be slightly slower.

In any case, Mendocino will be dramatically faster than Celeron. Furthermore, since the on-chip L2 cache will increase in speed along with the CPU, it should scale well to higher clock speeds. (Celeron, on

the other hand, would improve relatively little at higher speeds because it would be starved for memory bandwidth.)

COMPETITION

With the expanding Pentium II and Celeron processor families, Intel plans to shift most of the PC market from the Socket 7 (Pentium-compatible) bus architecture to the Slot 1 design. Intel can drive this transition by lowering the price of its Celeron CPUs close to the level of a comparable or slower Pentium/MMX chip. PC makers will be able to produce a broad product line from a single motherboard design. Within a few months, Intel is likely to be shipping far more Pentium II and Celeron CPUs than Pentium/MMX chips. The last stronghold of Pentium/MMX will be in notebooks, but even there the transition is beginning.

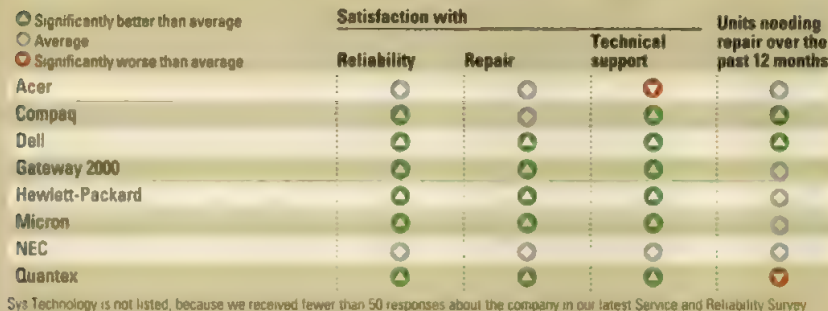
In the world of Slot 1 systems, there isn't a lot of choice other than which Intel processor you want to use, and as always, what peripherals are included. Intel is the only supplier of Slot 1 processors and the only supplier of system-logic chip sets for Slot 1 systems. The L2 cache is built into the processor module and comes in only one size, so this too has been eliminated as a possible differentiator among systems.

Intel's microprocessor competitors are sticking with the Socket 7 interface, at least for 1998. Today, these companies have strong alternatives for the 233-MHz Pentium/MMX—the AMD K6, the Cyrix 6x86MX, and the IDT WinChip—and AMD and Cyrix have just moved up to the 266-MHz level. These CPUs are slower than Pentium II chips at the same clock speed, however, especially on applications that make heavy use of floating-point or MMX instructions.

AMD, Cyrix, and IDT will all be shipping Socket 7 processors faster than Intel's fastest Pentium/MMX by the end of the year, if they deliver on their plans. In addition, all three companies are adding a new set of instruction-set extensions to speed 3-D graphics, for which they have agreed on a common standard. Intel will have its own extensions for 3-D graphics, but these extensions will not debut until the processor code-named *Katmai*, which will still use the Pentium II core, reaches the market in 1999.

Toward the end of the year, AMD and IDT both plan to launch versions of their

Vendor Service and Reliability



We include ratings of vendors for which we received at least 50 responses on our latest Service and Reliability Survey of 17,000 subscribers. These results reflect readers' experience with desktop PCs from a given vendor. We analyzed the data using a *t-test*, a standard statistical procedure for identifying differences from the average that are significant at the 95 percent confidence level. For details, see our July 1997 issue. The **satisfaction** rankings reflect respondents' experience with **reliability**, **repair**, and **technical support** over the past two years. **Units needing repair** refers to the proportion of desktops that the respondents said needed repair during the past year. Here, "significantly better than average" means the incidence of needed repairs was lower than average.

processors with an on-chip L2 cache, offering much of the benefit of the Slot 1 architecture. These CPUs will be much faster than the Celeron, but they may not have much advantage over Mendocino, which should appear in systems by early 1999.

AMD's K6+ 3D and IDT's unnamed WinChip with L2 cache promise to bring Socket 7 performance to the level of a 300- to 400-MHz Pentium II. For entry-level to midrange performance, PCs based on those chips will be less expensive at a given speed, since the CPUs typically cost 30 to 50 percent less than their Intel equivalents. Socket 7 chip sets are also less expensive than Slot 1 chip sets.

Beyond Socket 7, AMD plans to shift to *Slot A*, a module of its own design that is the same size and uses the same connector as Intel's Slot 1 module but has a different bus interface (derived from Digital's latest Alpha processor design). AMD traded its right to build CPUs that plug into sockets designed for Intel CPUs as part of a deal to get ongoing access to all of Intel's patents. Cyrix's parent, National, and its foundry, IBM, have no such limitation in their Intel patent cross-licenses, and it is likely that Cyrix eventually will build Slot 1-compatible modules.

SLOT 2

Intel will soon introduce a new type of Pentium II processor module for servers

and high-end workstations. These *Slot 2* modules will have full-speed L2 caches, twice the speed of those on Slot 1 processors, and much larger L2 caches will be available. Up to four Slot 2 processors can be connected to form a multiprocessor system, whereas Slot 1 processors support only two per system.

Slot 2 modules are likely to be very expensive because they are costly to produce and because the high-end market for which they are designed is relatively price-insensitive. A \$2,000 processor is affordable in a \$20,000 server but not in a \$2,500 PC. Thus Slot 2 processors will have no role in the PC market outside servers and workstation-class desktop systems; they are unlikely ever to migrate down. Instead, Slot 1 will evolve to faster bus speeds (in 1999) to meet the needs of future processors. The size of the L2 cache provided by the generic SRAM chips will double from the current 512K about every 18 months.

The L2 cache RAMs in Slot 1 modules are industry-standard synchronous-burst SRAMs that Intel buys from several other chip makers. The SRAM business is highly competitive, so prices are low. To achieve full-speed L2 cache operation, how-

ever, Intel will manufacture its own SRAMs for the Slot 2 modules. These custom SRAMs are large chips that require Intel's most advanced process technology. They are more expensive for Intel to produce than the Deschutes processor chip, and a typical Deschutes module will have two or more of the cache chips.

The Slot 2 module is larger than a Slot 1 module to provide room for more of the large SRAM chips. There are a few additional signals on the connector for multiprocessor support and many more power and ground pins to carry the high current required. With a fast CPU and several very fast SRAM chips, Slot 2 modules will use a lot of power and will need large heat sinks and prodigious airflow.

WHAT THIS MEANS TO YOU

Intel's desire to proliferate the Pentium II into every market segment, as well as competition from other vendors, is very good news for buyers. These new systems are not only fast, they're affordable. You can get a terrific system for under \$3,000, and vendors are not cutting corners to get there.

AcerPower 8000

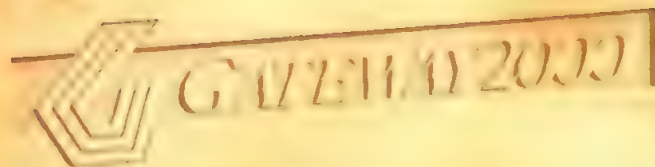
Pentium II/400, 6.1GB hard disk, 17-inch monitor, SDRAM. Business Winstone 98 score: 26.

\$2,670 street.

Whereas most of the systems we reviewed are meant for individual power users, the \$2,670 AcerPower 8000 suits the networked corporate user. Similar to the Quantex QP6/400 SM-4x in hardware and performance—though slightly more expensive—this DMI-compliant mini-tower ships with an Intel EtherExpress network card and LANdesk Client Manager.



New
small business
solutions right around
the corner.





They whipped up a company-wide network in no time flat.

When they needed a fast, efficient network to track inventory and create a customer database, they called Gateway Business Direct — the small business' answer to an all-in-one computer company, consulting service and 24-hour technical support center.

We save time *and* money for everyone from chefs to contractors by recommending PC or network packages that solve the business problems you face every day. Not to mention alleviating the added stress of doing it all yourself. Call today!



Intel Pentium II processors are standard on many GATEWAY™ NS-Series servers and GP-Series professional PCs.

Why Gateway Business Direct?

Expert Technology Consultants

Don't exactly have an IS department on hand? At Gateway Business Direct, we're experts on business computing so you don't have to be.

Outstanding Services

Do it all or leave it to us. It's your choice! Whatever you need, we can get it done.

Custom-Built Flexibility

Our philosophy is simple: customers should pay for what they need, not what they don't. We personalize every order with the right mix of hard drive capacity, monitor size, processor speed and more.

Peer-to-Peer Networks

Our peer-to-peer network packages are simple to set up and come with everything you need to get started. The sample at right is one of many!

Dedicated Technical Support

Our award-winning technicians are at your service 24 hours a day, and the call is always toll-free.

Free Financing Consultation

Finally ... now you can place your computer order and finance it in the same phone call. No runaround. No hassles. Just the way you like it! Ask about our cost-effective Gateway GoldValue lease, and other options.

Peer-to-Peer Complete Network

Two (2) GP-Series PCs with:

- Intel® 233MHz Pentium® II Processor with 512K Cache
- 32MB SDRAM
- EV500 .28 Screen Pitch 15" Monitor (13.9" viewable)
- 4MB AGP Graphics
- 2GB 11ms Ultra ATA Hard Drive
- 13X min/32X max CD-ROM Drive
- 3.5" Diskette Drive
- ▶ 3Com® 10/100 Network Card
- ▶ Peer-to-Peer Network Cable
- GP-Series Mid-Tower Case
- 104" Keyboard & MS® IntelliMouse™
- ▶ Microsoft® Windows® 95 & Microsoft Windows 98 Upgrade Offer
- MS Office 97, Small Business Edition plus Bookshelf® 98
- Gateway Gold™ Service & Support for Business Direct
- ▶ Step-By-Step Setup Manual

\$3039 GoldValue Lease \$107/mo.¹



8 8 8 - 2 8 5 - 6 2 3 9

www.gateway.com

Check out our other ad in this magazine for the best home PCs in the business!



GP6-300

► **Intel® 300MHz Pentium® II Processor with 512K Cache**

- 64MB SDRAM
- EV700 .28 Screen Pitch 17" Monitor (15.9" viewable)
- 4MB 3-D AGP Graphics
- 4GB 11ms Ultra ATA Hard Drive
- 13X min/32X max CD-ROM Drive
- 3.5" Diskette Drive

- GP-Series Mid-Tower Case
- 104" Keyboard & MS® IntelliMouse™

► **Microsoft® Windows® 95 & Microsoft Windows 98 Upgrade Offer**

- MS Office 97, Small Business Edition plus Bookshelf® 98
- Gateway Gold™ Service & Support for Business Direct

\$1999 GoldValue Lease \$71/mo.[†]

- With 266MHz Pentium II Processor & 32MB SDRAM

\$1749 GoldValue Lease \$62/mo.[†]

He designed the building, e-mailed plans to the client and put his partner's 1965 graduation photo online.

To build an architecture firm from the ground up, he needed a complete computing solution — fast. Gateway Business Direct delivered the PCs and advice he was looking for. Need to link your whole office to one printer? Gateway peer-to-peer packages let you do that plus establish a convenient file sharing system. And with a powerful 350 or 400MHz Pentium® II processor with the ultra-fast Intel 440BX AGPset on your side, the opportunities are limitless! Call today and take your business to the top floor.



Pictured left to right: GATEWAY™ GP-Series PCs with desktop and mid-tower cases.

Desktop PCs & Servers For Small Business

GP6-350

- ▶ Intel 350MHz Pentium II Processor with 512K Cache
- 64MB SDRAM
- EV700 .28 Screen Pitch 17" Monitor (15.9" viewable)
- 8MB 3-D AGP Graphics
- 10GB 9.5ms Ultra ATA Hard Drive
- 13X min/32X max CD-ROM Drive
- 3.5" Diskette Drive
- GP-Series Mid-Tower Case
- 104" Keyboard & MS IntelliMouse
- ▶ MS Windows NT 4.0
- MS Office 97, Small Business Edition plus Bookshelf 98
- Gateway Gold Service & Support for Business Direct

\$2499 GoldValue Lease \$89/mo.†

GP6-400

- ▶ Intel 400MHz Pentium II Processor with 512K Cache
- 64MB SDRAM
- ▶ EV900 .26 Screen Pitch 19" Monitor (18" viewable)
- 3MB 3-D AGP Graphics
- 10GB 9.5ms Ultra ATA Hard Drive
- 13X min/32X max CD-ROM Drive
- 3.5" Diskette Drive
- GP-Series Mid-Tower Case
- 104" Keyboard & MS IntelliMouse
- ▶ MS Windows NT 4.0
- MS Office 97, Small Business Edition plus Bookshelf 98
- Gateway Gold Service & Support for Business Direct

\$2999 GoldValue Lease \$106/mo.†

NS-7000 Server

- Intel 233MHz Pentium II Processor with 512K ECC Cache
- SMP-Compliant (Dual-Processor Ready, Supporting Up To Two Pentium II Processors - upgradable to 266, 300 & 333MHz)
- 64MB EDO Memory - expandable to 512MB)
- ECC Memory System
- 4GB Ultra Wide SCSI-5 7,200 RPM Hard Drive
- Integrated Ultra Wide SCSI-3 Controller
- 13X min/32X max SCSI CD-ROM Drive & 3.5" Diskette Drive
- 3Com 10/100 Twisted Pair Ethernet Adapter
- Three 32-Bit PCI, Two EISA, One PCI EISA Slots
- 4 DIMM Slots
- ▶ EV500 .28 Screen Pitch 15" Monitor (13.9" viewable)
- Integrated 32-Bit PCI Graphics with 2MB DRAM
- ▶ TelePath® Modem with x2™ Technology
- Seven-Bay NS-7000 Server Tower Case (not pictured) with 300-Watt Power Supply, Includes five External Bays (three 5.25" and two 3.5") and two 3.5" Internal Bays
- 104" Keyboard & Mouse
- ▶ MS BackOffice® Small Business Server (1-4 CPUs, 10 User Licenses)
- AI R InforManager® Server Management System with ActiveCPR™ Processor Protection

\$4229 GoldValue Lease \$148/mo.†

Buy a Gateway PC with Windows 95 and receive a Windows 98 upgrade offer! Call for details.



8 8 8 - 2 8 5 - 6 2 3 9

www.gateway.com

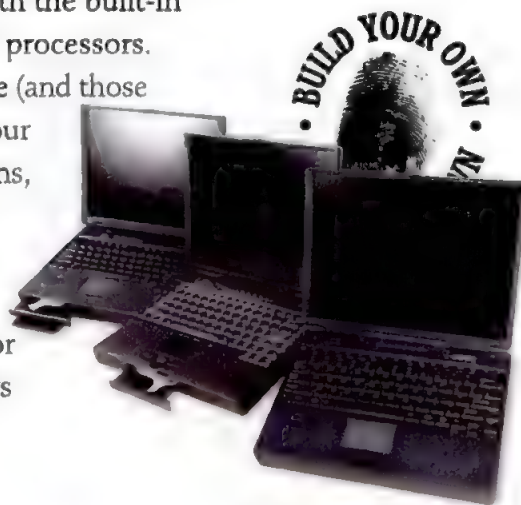


© 1998 Gateway 2000, Inc. All rights reserved. The Intel Inside Logo, Intel, LANdesk and Pentium are registered trademarks, and MMX is a trademark of Intel Corporation. Not all Solo PCs contain the Pentium II processor. All other brands and product names are trademarks of their respective companies. All prices and configurations are subject to change without notice or obligation. Prices do not include shipping, handling or any applicable taxes. Many Gateway products are custom engineered to Gateway specifications, which may vary from the retail versions of the software and/or hardware in functionality, performance or compatibility. *Leasing arranged by independent lease companies to qualified commercial companies. Lease terms based on 36-month term. Lease terms subject to change without notice or obligation. All artwork © 1998 University of South Dakota.

She sold five sculptures with one portable gallery presentation.

Gateway Solo™ PCs make it easy to take effective sales presentations wherever she goes — with the built-in obsolescence protection of Pentium® II processors.

Every Solo configuration you see here (and those you don't) can be personalized with your choice of features. And docking stations, memory and AC adapters are always compatible across the product line to save you money. Call today and take *your* show on the road! Better prices for features like this plus 14.1-inch displays just don't exist.



Pictured left to right:
Solo 9100, 5100 and 2300 PCs.

GATEWAY™ Solo Portable PCs

2300SE

- 12.1" SVGA DSTN Color Display
- Intel® 200MHz Pentium® Processor with MMX™ Technology
- 16MB SDRAM (expandable to 192MB)
- 2MB Graphics Accelerator w/ 64K Colors
- Modular 8X min/20X max CD-ROM Drive
- Modular 3.5" Diskette Drive
- 2GB Hard Drive
- NiMH Battery & AC Pack
- USB Ports, CardBus & Zoomed Video Support
- NTSC/PAL Video Output
- Integrated 16-Bit Sound & Stereo Speakers
- EZ Pad® Pointing Device
- Carrying Case
- Microsoft® Windows® 95 & MS® Works 4.5
- LapLink® for Windows 95 & McAfee® VirusScan
- Gateway Gold™ Service & Support for Portable PCs

\$1899 GoldValue Lease \$68/mo.†

- With 200MHz Pentium Processor with MMX Technology, 32MB SDRAM, PC Card Modem with x2™ Technology & MS Office 97, Small Business Edition plus Bookshelf® 98

\$2149 GoldValue Lease \$76/mo.†

5100SE

- ▶ 14.1" XGA TFT Color Display
- Intel 233MHz Pentium® II Processor with 512K Cache
- 32MB SDRAM (expandable to 144MB)
- 2MB EDO Video RAM
- Modular 8X min/20X max CD-ROM Drive
- Modular 3.5" Diskette Drive
- 2GB Hard Drive
- Lithium Ion Battery & AC Pack
- 2 USB Ports, CardBus & Zoomed Video Support
- NTSC/PAL Video Output
- Integrated 16-Bit Sound & Stereo Speakers
- ▶ EZ Pad Plus Scrolling Pointing Device
- Carrying Case
- MS Windows 95 & MS Works 4.5
- LapLink for Windows 95 & McAfee VirusScan
- Gateway Gold Service and Support for Portable PCs

\$2899 GoldValue Lease \$103/mo.†

- With PC Card Modem with x2 Technology & MS Office 97, Small Business Edition plus Bookshelf 98

\$3199 GoldValue Lease \$112/mo.†

9100XL

- ▶ 14.1" XGA TFT Color Display
- Intel 266MHz Pentium® II Processor with 512K Cache
- 64MB SDRAM (expandable to 192MB)
- 4MB EDO Video RAM
- ▶ Removable Combo 8X min/20X max DVD-ROM & 3.5" Diskette Drive
- 5GB Hard Drive
- Two Lithium Ion Batteries & AC Pack
- USB Ports, CardBus & Zoomed Video Support
- NTSC/PAL Video Input & Output
- 16-Bit Wavetable Sound & Altec Lansing® Speakers
- PC Card Modem w/ x2 Technology & cellular support
- EZ Pad Pointing Device
- Deluxe Leather Carrying Case
- ▶ Gateway Solo Mini Docking Station
- MS Windows 95 & MS Office 97, Small Business Edition plus Bookshelf 98
- LapLink for Windows 95 & McAfee VirusScan
- Gateway Gold Service & Support for Portable PCs

\$4899 GoldValue Lease \$171/mo.†

Solo 9100, PC Magazine Editors' Choice Award, January 1998



8 8 8 - 2 8 5 - 6 2 3 9

www.gateway.com

Choose 099 at www.pcmag.com/infolink

Along with the hard disk included with the Compaq Deskpro EP Series, Small Business Solutions, the 6.1GB disk used by the 8000 was the smallest in this roundup. The disk was also a relatively poor performer on our ZD Business Disk WinMark 98 tests, scoring well below disks in the Dell, Gateway, Micron, and NEC units. Its ZD 3D WinMark 98 score was also below average, indicative of Acer's integrated ATI 3D Rage Pro AGP solution (which performed no better in the reviewed Compaq Deskpro EP Series, Small Business Solutions or the HP Brio PC 8532). In the ZD CD-ROM WinMark 98 test, the system produced an above-average score but couldn't reproduce the low CPU-utilization numbers of the drives used by Compaq, Gateway, and Micron. Other benchmark test scores were average.

Not even a thumbscrew need be removed to open the 8000's chassis. After shifting a small metal tab in the rear (used for locking the chassis), you simply squeeze a handle beneath the machine and pull the chassis forward. Though Acer provides AGP graphics on the motherboard, you don't have the option of upgrading to a newer solution. The unit came with a pair of 32MB DIMM modules rather than a single 64MB module, which forces you to discard the modules to upgrade to the maximum of 384MB.

Acer also bundles Adobe Acrobat, McAfee AntiVirus, and Lotus Organizer with the system. This unit has a three-year warranty with a year of on-site service and 24-hour technical support. All told, the AcerPower 8000 is average—whether the unit is compared with standalone multimedia desktops or with managed systems meant for the corporate environment.
—Cade Metz

Acer America Corp., San Jose, CA; 800-733-2237, 408-432-6200; www.acer.com. Choose 537 at www.pcmag.com/infolink.

Compaq Deskpro EP Series, Small Business Solutions

Pentium II/400, 6.1GB hard disk, 17-inch monitor, SDRAM. Business Winstone score: 25.

\$3,080 street.

Compaq Computer Corp.'s Deskpro EP Series, Small Business Solutions (\$3,080



street) is a mediocre performer with average internal hardware, but it has a uniquely adaptable chassis.

This vendor also offers the Deskpro EN, which, like Dell's OptiPlex, is meant for networked corporate environments. The Deskpro EP reviewed here is a standalone machine that, like the Dell Dimension XPS R400, brings high technology to power users and small businesses, although it continues to provide DMI 2.0 support and some management features for those who need them.

It's easy to convert the Deskpro EP from a desktop into a mini-tower or vice versa. When the machine lies flat as a desktop, its top and front panels come off with the removal of two thumbscrews. When converting the unit to a mini-tower, you press a button to release the floppy disk and CD-ROM drives, turn them 90 degrees, and reinsert them. You can also replace a plastic insert so the Deskpro logo remains horizontal.

Like the AcerPower 8000 and the HP Brio PC 8532, the Deskpro EP uses an ATI Rage Pro 2X AGP graphics chip set and produced below-average results on our ZD Business Graphics WinMark 98 and 3D WinMark tests. The unit also scored poorly on our Business Disk WinMark 98 tests and offered less disk space than most (6.1GB). Its Business Winstone 98 score was average, but the unit's CD-ROM WinMark 98 score was below average. Its Goldstar CD-ROM

drive reaches a speed of only 24X, but, like the drives of the Gateway and the Micron units, its CPU utilization numbers are typically low.

The system ships with a 56-Kbps K56flex modem and a suite of applications including Microsoft Office Small Business Edition, Symantec's Norton AntiVirus, publishing software for an e-commerce site, and Compaq's Insight Personal Edition. Compaq provides 24-hour technical support and a three-year-parts, one-year-labor warranty with a year of on-site service. The Deskpro EP has its chassis to recommend it, but even this feature can't make up for middling performance.—CM

Compaq Computer Corp., Houston; 800-345-1518, 281-370-0670; www.compaq.com.

Dell Dimension XPS R400

Pentium II/400, 13.7GB hard disk, 17-inch monitor, SDRAM. Business Winstone 98 score: 28. \$3,229 direct.

The salient feature of Dell's high-performance Dimension XPS R400 is not its price but its hard disk. The \$3,229 unit uses a 13.7GB IBM Deskstar Ultra ATA hard disk with industry-leading capacity and performance. The system's 2X DVD drive and three-piece Altec Lansing speaker set are also impressive.

The R400 benefits from a unique device driver named IOS0.VXD. Though the driver helped produce a ZD Business Disk WinMark 98 score roughly twice as high as any other in the roundup, the real-world benefit is not nearly as significant, as indicated by the fact the unit's Winstone 98 score did not improve as dramatically. The machine and the Sys



When Business People See The Quantex Story, They Buy It.

Quantex Computers



**Customer
Satisfaction**



**Top of the Line
Performance**



**Awards &
Honors**



**QSentry
Technology**



**Award-Winning
Support**



**Business
Computing Solutions**



We give business people a lot worth buying

WOULD YOU BUY AGAIN?

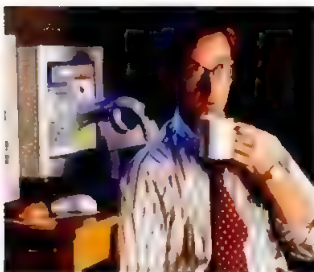
VENDOR	% WHO WOULD BUY THE SAME BRAND
Dell	92%
Quantex	91%
IBM	89%
Micron	81%
Gateway	80%
Acer	74%
Digital	69%
Toshiba	61%
Compaq	58%
Packard Bell	51%

Windows Magazine, 2/97

OVERALL RANKINGS Technical Support Survey

PC VENDOR	GRADE
Quantex	Excellent
Dell	
IBM	
Compaq	
Gateway 2000	Good
Micron	
Acer	
Toshiba	Fair
Digital	Poor
Packard Bell	

Windows Magazine, 2/97



QSentry Technology is like having a full-time tech expert in your Quantex PC, alerting you to possible hardware problems before they become critical.

We make it our business to come up with computing solutions for your business

Quantex offers computing solutions that keep your business going--and growing. Our business desktops and notebooks provide the ultimate in performance, reliability and value--increasing productivity, reducing downtime and lowering the total cost of PC ownership. Featuring such enhancements as Intel Pentium® II processors and the Microsoft Windows NT operating system, Quantex business systems are the perfect solution for all your business needs. It's no wonder, we received a 91% "Buy Again" rating.

A technical support team that is one of the best in the business

Our support team is open for business 24 hours a day, seven days a week, 365 days of the year.

They're so good at providing expert help for your business PCs--that Quantex earned a superior

ranking of "Excellent" in a recent *Windows Magazine* survey that rated reliability, service and technical support. A ranking that puts us up there in a select group that includes Dell and IBM. Not bad, at all.



QSentry Technology for an extra sense of security

QSentry technology is a unique, customized PC health monitoring and support technology that automatically detects and notifies users of potential hardware problems that can be remedied before they become critical. Incorporation of the LM78 hardware management chip allows the monitoring of system conditions of system condition like temperature, voltage and fan speed. With QSentry, you're assured of continuous peak performance. And that's always good for business.





Business Desktops

Options: Zip 100MB Internal Drive w/one cartridge \$70 • Business Audio Kit (Sound Card & 6-attc Lansing ACS-90 Speakers) \$49 • HP LaserJet 6L Printer \$379
• MS Natural Keyboard Elite \$39 • APC Back-UPS 780 \$99 • APC Back-UPS 400 \$129 • APC Back-UPS 600 \$279

QP5/233 SB-1 \$1099

(with MMX Technology)

Business lease: \$39/Mo.

- 233MHz Pentium® Processor with MMX® Technology
- 2 Universal Serial Bus (USB) Ports / DMI 2.0
- 32MB EDO Memory / 512KB Pipelined Burst Cache
- 2 1GB EIDE Mode 4 HD / 3.5" 1.44MB Floppy Drive
- 64-bit 3D Graphics Card with 4MB SDRAM
- 15" Digital Monitor (13.8" viewable)
- Intel Pro 100 PCI Ethernet Adapter w/RJ-45
- 32X Max EIDE CD-ROM Drive
- Quantex Mid Tower Case
- 104-Key Keyboard with MS Mouse
- MS Windows 95 with MS Plus
- 3 year limited warranty with 1-year On-Site Service**
- 24-hr/7-day Technical Support
- QEntry Technology (including Intel LANdesk Client Manager V3.1)
- Upgrade to Windows NT Workstation 4.0 for \$39

QP6/233 SB-1 (w/ Pentium® II Processor), \$1199

QP6/266 SB-1 (w/ Pentium® II Processor), \$1249

QP6/233 SB-2 \$1499

(featuring Pentium® II processor)

Business lease: \$53/Mo.

- 233MHz Pentium® II Processor
- 2 Universal Serial Bus (USB) Ports / DMI 2.0
- 32MB SDRAM Memory / 512KB Secondary Cache
- 4 3GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- Matrox Productiva G100 AGP Graphics with 8MB SDRAM
- 15" Digital Monitor (15.8" viewable)
- Choice of Intel Pro 100 Ethernet Controller with Wake-On-LAN Technology or K56flex protocol Fax/Modem*
- 32X Max EIDE CD-ROM Drive
- Quantex ATX Mid Tower Case
- 104-Key Keyboard with MS IntelliMouse
- MS Windows 95 with MS Plus
- MS Office 97 Small Business Edition
- 3 year limited warranty with 1-year On-Site Service**
- 24-hr/7-day Technical Support
- QEntry Technology (including Intel LANdesk Client Manager V3.1)
- Upgrade to Windows NT Workstation 4.0 for \$39

QP6/266 SB-2 (w/ Pentium® II Processor), \$1549

QP6/300 SB-2 (w/ Pentium® II Processor), \$1649

QP6/300 SB-3 \$1899

(featuring Pentium® II processor)

Business lease: \$67/Mo.

- 300MHz Pentium® II Processor
- 2 Universal Serial Bus (USB) Ports / DMI 2.0
- 64MB SDRAM Memory / 512KB Secondary Cache
- 6 4GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- 3D Labs Permedia 2 AGP Graphics Card with 8MB SDRAM
- 17" Digital Monitor w/NEC ChromaClear CRT (15.9" viewable 25 dp, 1600x1200 max resolution)
- Choice of Intel Pro 100 Ethernet Controller with Wake-On-LAN Technology or K56flex protocol Fax/Modem*
- 32X Max EIDE CD-ROM Drive
- Quantex ATX Mid Tower Case
- 104-Key Keyboard with MS IntelliMouse
- MS Windows NT 4.0 Workstation
- MS Office 97 Small Business Edition
- 3-year limited warranty with 1-year On-Site Service**
- 24-hr/7-day Technical Support
- QEntry Technology (including Intel LANdesk Client Manager V3.1)

QP6/266 SB-3 (w/ Pentium® II Processor), \$1799

QP6/333 SB-3 (w/ Pentium® II Processor), \$2049

QP6/333 SB-4 \$2249

(featuring Pentium® II processor)

Business lease: \$79/Mo.

- 333MHz Pentium® II Processor
- 2 Universal Serial Bus (USB) Ports / DMI 2.0
- 64MB SDRAM Memory / 512KB Secondary Cache
- 8 4GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- 3D Labs Permedia 2 AGP Graphics Card with 8MB SDRAM
- 18" Digital Monitor (16.1" viewable)
- Choice of Intel Pro 100 Ethernet Controller with Wake-On-LAN Technology or K56flex protocol Fax/Modem*
- 32X Max EIDE CD-ROM Drive
- Quantex ATX Mid Tower Case
- 104-Key Keyboard with MS IntelliMouse
- MS Windows NT 4.0 Workstation
- MS Office 97 Small Business Edition
- 3 year limited warranty with 1-year On-Site Service**
- 24-hr/7-day Technical Support
- QEntry Technology (including Intel LANdesk Client Manager V3.1)
- Upgrade to Zip 100MB Internal Drive for \$79

QP6/266 SB-4 (w/ Pentium® II Processor), \$1999

QP6/300 SB-4 (w/ Pentium® II Processor), \$2099

Microsoft Office 97

Small Business Edition includes: Word 97 • Excel 97 • Outlook 97 • Publisher 97 • Small Business Financial Manager 97 • Automap Streets Plus

Business Notebooks

Quantex H-1210 \$1899

(with MMX Technology)

Business lease: \$67/Mo.

- 200MHz Pentium® processor with MMX® Technology
- Intel Mobile Module (IMM) Architecture
- 12" SVGA Active Matrix Display
- 32MB SDRAM (expandable to 144MB)
- 512KB Pipelined Burst Cache
- 2GB HD / 3.5" 1.44MB Modular Floppy Drive
- PCMCIA K56flex protocol Fax/Modem*
- 24X Modular CD-ROM Drive
- PCI Bus with 128-bit graphics accelerator
- Integrated 16-bit Stereo Sound and Speakers
- Smart Lithium Ion Battery
- USB and Fast IR Ports
- Integrated Personal Touchpad
- MS Windows 95
- Corel Office Suite 8
- Carrying Case
- 24-hr/7-day Technical Support
- 3-year limited warranty on CPU and Main Memory
- 1 year parts and labor limited warranty on all other components
- Add a Deluxe Carrying Case for only \$39
- Add a PCMCIA NIC for only \$129
- Add a Mini-Docking Station for only \$169
- Add a 2nd Lithium Ion Battery for only \$169

Quantex H-1331 \$2899

(with MMX Technology)

Business lease: \$102/Mo.

- 266MHz Pentium® processor with MMX® Technology
- Intel Mobile Module (IMM) Architecture
- 13.3" XGA Active Matrix Display
- 64MB SDRAM (expandable to 144MB)
- 512KB Secondary Cache
- 4GB HD / 3.5" 1.44MB Modular Floppy Drive
- PCMCIA K56flex protocol Fax/Modem*
- 24X Modular CD-ROM Drive
- PCI Bus with 128-bit graphics accelerator
- Integrated 16-bit Stereo Sound and Speakers
- Smart Lithium Ion Battery
- 2nd Lithium Ion Battery
- Mini-Docking Station
- USB and Fast IR Ports
- Integrated Personal Touchpad
- MS Windows 95 or Windows NT Workstation 4.0
- MS Office 97 Small Business Edition
- Carrying Case
- 24-hr/7-day Technical Support
- 3-year limited warranty on CPU and Main Memory
- 1 year parts and labor limited warranty on all other components
- Add a Deluxe Carrying Case for only \$39
- Add a PCMCIA NIC for only \$129

QP6/333 SM-4x \$2299

(featuring Pentium® II processor)

Business lease: \$81/Mo.

- 333MHz Pentium® II Processor
- 64MB SDRAM Memory / 512KB Secondary Cache
- 8 4GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- 3D Labs Permedia 2 AGP Graphics Card with 8MB SDRAM
- 19" Digital Monitor (18.1" viewable)
- K56flex protocol Fax/Modem* w/Voice Mail and Speakerphone
- 32X Max EIDE CD-ROM Drive
- Ensing 32-Bit Wavetable Sound Card
- Altrec Lansing ACS 90 Speakers with ACS-250 subwoofer
- Quantex ATX Mid Tower Case
- 104-Key Keyboard with MS IntelliMouse
- MS Windows 95 with MS Plus!
- Power Multimedia Software Bundle
- Microsoft Office 97 Small Business Edition
- 3 year limited warranty with 1-year On-Site Service**

QP6/266 SM-4x (w/ Pentium® II processor), \$2049

QP6/300 SM-4x (w/ Pentium® II processor), \$2149

QP6/333 SM-4x SE \$2599

(featuring Pentium® II processor)

Business lease: \$91/Mo.

- 333MHz Pentium® II Processor
- 128MB SDRAM Memory / 512KB Secondary Cache
- 11.5GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- 128-bit RIVA 128 3D AGP Graphics with 4MB SDRAM
- 19" Digital Monitor (18.1" viewable)
- K56flex protocol Fax/Modem* w/Voice Mail and Speakerphone
- Ensing 32-Bit Wavetable Sound Card
- Altrec Lansing ACS 490 Speakers with subwoofer
- Quantex ATX Mid Tower Case
- 104-Key Keyboard with MS IntelliMouse
- MS Windows 95 with MS Plus!
- Power Multimedia Software Bundle
- Microsoft Office 97 Small Business Edition
- 3 year limited warranty with 1-year On-Site Service**

QP6/266 SM-4x SE (w/ Pentium® II processor), \$2399

QP6/300 SM-4x SE (w/ Pentium® II processor), \$2499

Power Multimedia Software: • MS Money '97 • Office Mate • Day Planner Pro • Power Business Plans • Form Designer • Project Manager Pro • Labels Unlimited • Compton's Reference Collection • Dr. Solomon's Find-Virus • MS Internet Explorer 4.0

H-1210 w/200MHz Pentium processor w/MMX Technology \$1999

H-1331 w/233MHz Pentium II processor \$3089

H-1331 w/266MHz Pentium II processor \$3299

© 1998 Quantex Microsystems, Inc. All Rights Reserved. 4065 Pierce Street, Summit NJ 07973. Sales Hours: M-F 9 a.m. - 12 a.m. (ET) - Sat. 9 a.m. - 6 p.m. All desktop system sales are subject to Quantex's three-year limited warranty and terms and conditions of sale. The three-year limited warranty includes first year parts and labor. Second and third year parts only warranty. *No on-site service is available outside of the continental USA. On-site service is provided at the sole discretion of Quantex. On-site service is provided by an independent third-party provider. For details on our warranty or money back guarantee call or write us. Other peripherals such as print or modems, etc., are covered by manufacturer's warranty. Software titles are subject to change and cannot be substituted. All prices and configurations are subject to change without notice or obligation and do not include shipping or sales tax. All returned items must have a conspicuous RMA number issued by Quantex and be in original packaging. 30-day money back policy does not include return freight or original shipping/handling charges. *Quantex K56flex Fax/Modems support the future ITU V.90 standard. Maximum transmission speed of up to 56Kbps when downloading and 33Kbps when uploading data. Actual speeds may vary depending on line conditions and correct FCC restrictions. Wake-Up LAN is currently not supported through routers. System temp., voltage, and fan speed monitoring available only on Pentium II processor based 58 series. Quantex is not responsible for errors in typographic or photographic. Pentium and the Intel Inside logo are registered trademarks and MMX is a trademark of Intel. All other company trademarks are trademarks of their respective company.

Choose 074 at www.pcmag.com/infolink

QUANTEX
1.800.346.6572
www.quantex.com

BENCHMARK TESTS

400-MHz Pentium II PCs



Peripherals made the difference: Top performers used 7,200-rpm hard disks, Matrox Millennium II cards for 2-D graphics, and cards with the nVidia RIVA 128 chip set for strong 3-D results.

What the Numbers Mean

ZD Business Winstone 98 Tying for first place were the Dell Dimension XPS R400 and the Sys Performance Pro 400BADD. Including these two, the systems with fast-spinning 7,200-rpm hard disks led the field. Another essential feature needed for a top Winstone score is strong 2-D graphics capabilities. The top-scoring Matrox Millennium II AGP card contributed to the Sys unit's impressive result.

At the other end of the performance scale is the HP Brio PC 8532, which uses a Quantum Bigfoot TX hard disk that spins at 4,000 rpm. This disk is a cost-conscious choice and doesn't fare well when running the Business Winstone's applications. Accordingly, the HP Brio PC 8532 came in last, with a score that was almost 20 percent off the pace set by the Dell and Sys PCs.

ZD Business Graphics WinMark 98 Except in rare cases, most of today's graphics cards are more than sufficient when processing 2-D information. Historically a good performer, the Millennium II AGP card helped the Sys Performance Pro to the top spot on our tests. The card worked so well that it helped the Sys unit surpass a score of 200, the first time this has happened on these tests.

The trend today is for graphics chip sets to combine 2-D and 3-D acceleration. The nVidia RIVA 128 is just such a chip set. It combines solid 2-D performance, provided by its 128-bit graphics engine and 128-bit SGRAM interface, with very good 3-D acceleration. This chip set was found in the Dell, Gateway, Micron, and NEC systems.

ZD Business Disk WinMark 98 The Dell system stands far above the others on this test suite. The reason: its driver, called IOS0.VXD. A VXD file is a virtual device driver that has direct access to the

operating system kernel. The IOS0.VXD driver inflates the Disk WinMark 98 score significantly above what you would actually see with mainstream applications—slightly more than doubling it. Business Disk WinMark 98 runs with a small memory footprint that lets the VXD file use the extra memory space to read ahead and cache data used in the tests, thus yielding a higher score.

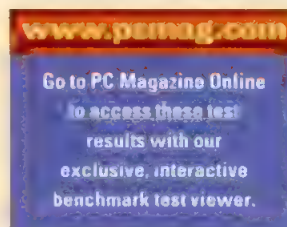
Although there is a real-world performance increase associated with this driver, the increase is not as large as the Business Disk WinMark result would lead you to believe. We ran the Business Disk WinMark and Business Winstone tests on the Dell unit both with and without the driver enabled. The numbers we report, a disk score of 3,360 and a Winstone score of 28, were achieved with Dell's VXD enabled. Without the driver enabled, the unit had a more average disk score of 1,655. Its Business Winstone score drops by 7 percent, to 26.

Ziff-Davis is currently working on updating the Business Disk WinMark tests to reflect more accurately the gains achieved by this driver. The update will be available in the next release of the benchmark tests, scheduled for November 1998.

Not including the Dell unit, systems with 7,200-rpm disks performed more than 25 percent faster than those with slower-spinning disks. The Quantum Bigfoot TX disk in the HP Brio PC 8532 spins at a comparatively slow 4,000 rpm and posted a score that was over 40 percent lower than the average here.

ZD 3D WinMark 98 The Sys unit came with a Matrox Millennium II AGP card, a Diamond Monster 3D PCI card, and was the only unit to use separate cards for 2-D and 3-D acceleration. The Monster 3D card, based on the 3Dfx Voodoo II chip, was the top 3-D performer, besting the four nVidia RIVA 128-based cards.

The nVidia-based cards came in two varieties: two from STB and two from Diamond Multimedia. The two STB Velocity 128 cards, in the Gateway 2000 and Dell systems, edged out the two Diamond Viper 330 cards used in the NEC and Micron PCs. Although they use the same graphics chips, card vendors can engineer their hardware and software differently. Slightly different dot clock speeds and more finely tuned drivers can affect performance. At the same time, however, constant fine tuning of drivers may decrease card



▲ High scores are best.

▼ Low scores are best

Bold type denotes first place.

AcerPower 8000

Compaq Deskpro EP Series

Dell Dimension XPS R400

Gateway G6-400

HP Brio 8532

Micron Millennia Xi 400

NEC Direction SPB 400

Quantex QP6/400 SM-4x

Sys Performance Pro 400BADD

**ZD Business
Winstone 98**

Score

26

25

28

27

24

27

27

24

28

26

25

28

27

24

27

27

24

28

**ZD Business
Graphics WinMark 98**

Score

137

133

143

148

134

134

135

138

207

137

133

143

148

134

134

135

138

207

**ZD Business
Disk WinMark 98**

Thousands of bytes per second

1,410

1,260

3,360²

1,780

974

1,840

1,820

1,290

1,590

1,410

1,260

3,360²

1,780

974

1,840

1,820

1,290

1,590

ZD 3D WinMark 98

Score

408

409

666

684

371

682

685

403

767

408

409

666

684

371

682

685

403

767

BETTER ►

BETTER ►

BETTER ►

BETTER ►

(1) With an Action MPEG 1 352 by 240 30 fps 300 KBps clip

(2) This score was enhanced by a virtual device driver, IOS0.VXD, which does not yield commensurate real-world performance. See "What the Numbers Mean" for more details.

stability, leading to operating system crashes and sending users on hunts for new drivers. We suspect that STB has tuned its card and drivers a bit more for performance than Diamond has, enabling the STB cards to score just under 8 percent better than the Diamond cards. Most users would not notice the difference, however.

The Acer, Compaq, and HP units, using ATI 3D Rage Pro-based graphics cards, and the Quantex system, which had a 3Dlabs Permedia-based card, could not keep up with the leaders.

ZD CPUmark₃₂ Because all of the systems use the same processor, it's no wonder that the scores were separated by only 6 percent, from first to last place. The Pentium II's cartridge contains the processor with its 32K of L1 cache as well as the external 512K of L2 cache. That leaves only the main memory subsystem as the differentiating factor. Since all of the systems also have 64MB of SDRAM, the slight variation in scores would likely be due to timing differences in memory settings.

CD-ROM and Multimedia Tests Tested units had both standard CD-ROM drives and DVD drives in this roundup. Generally, DVD drives have slower transfer rates than CD-ROMs and therefore performed near the bottom on the CD-ROM WinMark test. The CD-ROM drive in the Sys Performance Pro turned in exceptionally poor results even though it was a 32X (maximum) drive. We believe this may be a driver problem.

In our multimedia tests, systems running on the ATI or nVidia graphics cards all performed well, with high maximum frame-per-second rates. —Analysis written by Rich Fisco

How We Tested

The tested systems ran Windows 95, had 64MB of RAM, and had a 4GB hard disk or larger. We defragmented the hard disks before each test and let Windows 95 manage virtual-memory settings. Then we used the graphics drivers provided by the vendors. In all cases, the graphics subsystems could support 32-bit color, and we tested at this color depth.

ZD Winstone 98 is divided into two parts: **ZD Business Winstone 98**, which focuses on mainstream applications, and **ZD High-End Winstone 98**, which emphasizes CPU and graphics-intensive applications. We ran only the Business Winstone 98 tests on the systems in this roundup. These tests measure the time a PC takes to execute a set of scripts that exercise nine of the best-selling Windows 95 applications. ZD Business Winstone 98 weights a PC's test timings based on the applications' unit market shares. It derives a composite number and converts that to a relative score. (The score is relative to the

performance of a Dell Dimension Pentium/133 with 32MB of RAM, at 1,024-by-768 resolution with 16-bit color, running Windows NT 4.0 with Service Pack 3. The base score is defined as 10.)

ZD WinBench 98 measures a system's graphics, disk, processor, CD-ROM, full-motion video, and DirectDraw performances under Windows 95. **ZD Graphics WinMark 98** and **ZD Disk WinMark 98** are also each divided into business and high-end sections. We ran only the business portion of the suites on the tested systems.

The ZD Business Graphics WinMark 98 score is based on a log of GDI operations used in the Business Winstone 98 test suite. Scores are normalized to reflect performance relative to the base system used for Business Winstone testing. The ZD Business Disk WinMark 98 score is based on a log of disk functions used in the Business Winstone 98 suite. We record the results as thousands of bytes per second and convert them to a harmonic mean. We then weight this mean in the same way as the Business Winstone 98 score.

The first part of the **ZD 3D WinBench 98** tests, the **3D Quality** test, determines which of the 31 tested features the graphics card supports (the results are not charted). We then run the performance portion of 3D WinBench 98 to obtain the **3D WinMark 98** score. The test is made up of 19 scenes; each scene is rendered by hardware if the graphics card was found to support all the 3-D options in the scene, based on the 3D Quality test. If not, the scene is rendered in software. We installed Direct3D 5.0 on each system before testing.

The **ZD CPUmark₃₂** score gauges the speed of a PC's processor subsystem, which includes the CPU, L2 cache, and system RAM, under 32-bit operating systems.

The **ZD CD-ROM WinMark 98** test gauges the performance of each machine's CD-ROM subsystem, which includes the CD-ROM drive, adapter, and required software drivers. The tests are based on a profile of today's most popular Windows CD-ROMs. The **CD-ROM Access Time** score measures performance as the drive randomly accesses 2K blocks from the entire CD-ROM. The **CD-ROM CPU Utilization** score represents the percentage of the CPU's bandwidth occupied by servicing the CD-ROM subsystem as it retrieves data. We also report the results of the **CD-ROM Transfer Rate: Inside** test, which measures the throughput of a CD-ROM subsystem reading the inside track of the CD-ROM (the drive's minimal performance level).

WinBench 98 also includes a suite of video tests that measure a PC's ability to play full-motion AVI files. The tests run a video clip with four codecs: Cinepak, Indeo 3.2, Indeo 4.x, and MPEG. We tested all systems using MPEG only through ActiveMovie control. We report results from the **Full-Screen Scaling** test, which uses an Action, MPEG-1, 352-by-240, 30-fps, 300-KBps clip. We report **Maximum Frame Rate** and **CPU Utilization**.

ZD CPUmark ₃₂ Score	ZD CD-ROM WinMark 98 Thousands of bytes per second	CD-ROM Access Time (milliseconds) ▼	CPU Utilization (percent) ▼	Transfer Rate: Inside (thousands of bytes per second) ▲	Full-Screen Scaling ¹ CPU Utilization (percent) ▼	Maximum Frame Rate (frames per second) ▲
999	1,650	98	19	3,080	34	96.7
999	1,280	112	3	1,750	32	181.0
971	899	149	76	2,080	49	71.3
1,020	1,281	107	3	1,820	33	98.6
995	1,570	83	5	2,490	33	99.2
1,020	1,270	106	3	1,820	33	99.9
1,020	1,720	84	74	2,600	40	80.5
992	1,700	85	70	2,460	44	76.0
1,030	1,159	92	85	1,440	59	50.8

BETTER ►

BETTER ►

bilir



**No matter what language
you do business in—UNIX®
or Windows NT®—the**

**DIGITAL Personal Workstation family speaks your
native tongue.** There are Windows NT machines,
with your choice of Intel or the unrivaled speed
of Alpha. DIGITAL UNIX workstations with up to
600MHz of Alpha muscle. And the unique Personal
Workstation au-Series: it lets you start with DIGITAL
UNIX, then migrate to Windows NT when the time

is right. And
every Personal
Workstation
includes
PowerStorm™
3D graphics—
for visual

performance that wows even the most demanding
design and engineering pros. So become fluent
in productivity. Call 1-800-DIGITAL or visit
www.digital.com/bilingual. And get ready to win
in a networked world.

digital™

SUMMARY OF FEATURES

400-MHz Pentium II PCs



■ YES ■ NO	AcerPower 8000	Compaq Deskpro EP Series, Small Business Solutions	Dell Dimension XPS R400	Gateway G6-400	HP Brio PC 8532	Micron Millennia Xi 400	NEC Direction SPB 400
Price of tested configuration	\$2,670 street	\$3,080 street	\$3,229 direct	\$2,954 direct	\$2,480 street	\$3,399 direct	\$3,154 direct
Installed system RAM	64MB SDRAM	64MB SDRAM	64MB SDRAM	64MB SDRAM	64MB SDRAM	64MB SDRAM	64MB SDRAM
Hard disk	IBM DHEA-36481	Maxtor 86480D6	IBM DTTA-371440	IBM DTTA-371010	Quantum BigFoot TX	IBM DTTA-371010	IBM DTTA-371010
Capacity and interface	6.1GB ATA-3	6.1GB ATA-4	13.7GB ATA-4	9.6GB ATA-4	7.6GB Ultra ATA	9.6GB ATA-4	9.6GB ATA-4
Graphics adapter and interface	Integrated ATI Rage Pro AGP	ATI Rage Pro Turbo AGP	STB Velocity 128 AGP	STB Velocity 128 AGP	Integrated ATI Rage Pro AGP	Diamond Viper 330 AGP	Diamond Viper 330 AGP
Memory	4MB SGRAM	4MB SGRAM	4MB SGRAM	4MB SGRAM	4MB WRAM	4MB SGRAM	4MB SGRAM
Graphics chip set	ATI 3D Rage Pro AGP 2X	ATI 3D Rage Pro AGP 2X	nVidia RIVA 128	nVidia RIVA 128	ATI 3D Rage Pro AGP 2X	nVidia RIVA 128	nVidia RIVA 128
Monitor (measured diagonal size, in inches)	AcerView 79G (15.8)	Compaq V75 (16.3)	Sony D1025TM (15.9)	MAG EV700 (16.1)	Hewlett-Packard D2840A (15.8)	Hitachi CM751U (18.0)	NEC C700 (16.1)
Installed external RAM cache and type	512K pipelined-burst	512K pipelined-burst	512K pipelined-burst	512K pipelined-burst	512K pipelined-burst	512K pipelined-burst	512K pipelined-burst
Motherboard manufacturer	Acer	Compaq	Intel	Intel	Hewlett-Packard	Intel	Intel
BIOS manufacturer and version (or date)	Acer 3.1	Compaq (2/27/98)	Phoenix 4.0, Release 6.0	Phoenix 4.0, Release 6.0	Phoenix 4.0, Release 6.0	Phoenix 4.0, Release 6.0	Phoenix 4.0, Release 6.0
CD-ROM or DVD drive	32X Acer CD-932E	24X Goldstar CRD-8240B	20X Hitachi GD-2000 DVD	18X Toshiba SD-M1102 DVD	32X Hitachi CDR-8430	18X Toshiba SD-M1102 DVD	32X NEC 28B CD
DVD support	N/A	N/A	Hardware	Hardware	N/A	Hardware	N/A
MPEG-2 support	Software	Software	Hardware	Hardware	None	Hardware	Software
MPEG-2 hardware	N/A	N/A	Quadrant International Cinemas	Chromatic Research MPACT DVD Decoder	N/A	Diamond Maximum DVD Decoder Card	N/A
Sound device	Integrated Crystal 4610	Compaq ESS1869 (ISA)	Turtle Beach Montego A3D (PCI)	Integrated Ensoniq ESS 1371	Hewlett-Packard Aztech (ISA)	Integrated Crystal 4611	Integrated Crystal 4611
MIDI synthesis type	FM	FM	FM, wavetable	FM, wavetable	FM	FM	Wavetable
Speakers	Sound Force 550	Compaq, integrated into chassis	Altec Lansing ACS 495 with subwoofer	Boston Acoustics MicroMedia with subwoofer	LabTech HP Brio Speaker Kit	Advent AV390 with subwoofer	Altec Lansing ACS45N with subwoofer
Modem speed in Kbps	56.6 (K56flex)	56.6 (K56flex)	56.6 (x2)	56.6 (x2)	56.6 (K56flex)	56.6 (x2)	56.6 (x2)
Network adapter speed	100 Mbps	N/A	N/A	N/A	N/A	N/A	N/A
Expandability							
Maximum RAM	384MB	384MB	384MB	384MB	396MB	384MB	384MB
Expansion-bus slots	2 PCI, 1 PCI/ISA	1 ISA, 3 PCI, 1 PCI/ISA, 1 AGP	1 ISA, 3 PCI, 1 PCI/ISA, 1 AGP	1 ISA, 3 PCI, 1 PCI/ISA, 1 AGP	1 ISA, 3 PCI, 1 PCI/ISA	1 ISA, 3 PCI, 1 PCI/ISA, 1 AGP	1 ISA, 3 PCI, 1 PCI/ISA, 1 AGP
Front-accessible drive bays (5.25"/3.5")	2/2	2/1	3/2	3/2	3/2	3/2	1/3
Internal drive bays (5.25", 3.5")	0/3	0/2	0/1	0/3	0/1	0/3	2/2
Power-supply wattage	200	145	200	200	150	235	235
Parallel/serial/mouse ports	1/2/1	1/2/1	1/1/1	1/2/1	1/1/1	1/2/1	1/2/1
USB ports	2	2	2	2	2	2	2
Service and Support							
24-hour, 7-day live, toll-free technical support	■	■	■	■	■	■	■
Standard warranty on parts/labor	3 years/3 years	3 years/1 year	3 years/1 year	3 years/3 years	3 years/3 years	3-5 years/1 year	3 years/3 years
On-site service charge for 1 year	Included	Included	Included	Included	\$199	Included	Included
24-hour turnaround for parts replacement	■	■	■	■	■	■	■

N/A—Not applicable: The product does not have this feature.

Performance Pro still tied for first place on our ZD Business Winstone 98 tests, however.

On our ZD Business Graphics 98 and ZD 3D WinMark tests, the R400 was not a performance leader but did well. And game players, in general, should be satisfied with the Dell unit's STB Velocity 128 AGP card. But the R400's ZD CD-ROM WinMark 98 score was poor (the lowest in the roundup), which is not surprising in any system with a DVD drive. During

informal testing, the DVD drive proved adept, matching the audio performance of the R400's Turtle Beach Montego A3D PCI Audio Accelerator sound card and Altec Lansing speakers.

The subwoofer and surround-sound effects are brilliant, but the subwoofer lacks magnetic shielding and may distort the display if it is placed too close to the screen. The R400's chassis—which can be opened by removing a single thumb-screw—holds Intel's standard BX

motherboard and an Iomega Zip Drive.

Included is Microsoft Office Small Business Edition and Encarta, McAfee AntiVirus software, a suite of audio tools, and helpful documentation. The company's Service and Reliability scores are among the industry's highest, enhancing the appeal of this unit.—CM

Dell Computer Corp., Round Rock, TX; 800-388-8542, 512-338-4400; www.dell.com. Choose 538 at www.pcmag.com/infolink.

Quantex QP6/400 SM-4x Sys Performance Pro 400BADD

\$2,649 direct	\$3,195 direct
64MB SDRAM	64MB SDRAM
IBM DHEA-38451	Two Seagate ST34520A
8GB ATA-3	4 3GB Ultra ATA (each)
Diamond Fire GL1000 Pro AGP	Matrox Millennium II AGP
8 1MB SDRAM	8 1MB WRAM
3D Labs Permedia 2	Matrox 2164WA-B
3D Labs XP190 (17.8)	SYS SPM-17-MS (15.8)
512K pipelined-burst	512K pipelined-burst
Intel	ASUSTek
Phoenix 4.0, Release 6.0	Award (3/3/98)
32X Toshiba XM-6202B CD	32X TEAC CD-532E
N/A	N/A
None	None
N/A	N/A
Ensoniq AudioPCI (PCI)	Diamond Monster Board M80 (PCI)
Wavetable	FM, wavetable
Altec Lansing ACS90 with subwoofer	Altec Lansing ACS425 with subwoofer
56.6 (K56flex)	56.6 (x2)
100 Mbps	10/100 Mbps

384MB	768MB
1 ISA, 3 PCI, 1 PCI/ISA, 1 AGP	2 ISA, 3 PCI, 1 PCI/ISA, 1 AGP
2 / 1	3 / 2
0 / 2	0 / 3
200	235
1 / 2 / 1	1 / 2 / 1
2	2

3 years/1 year	1-6 years/5 years
Included	Included

to that tradition and is a multimedia machine without shortcomings. Though priced under \$3,000, the Gateway G6-400 gives power users and small businesses a DVD drive, hardware-based MPEG-2, a three-piece speaker set, and an Iomega Zip drive—not to mention a carefully optimized CPU subsystem and a good software bundle.

The PC, housed in Gateway's tool-free mini-tower chassis, boasts an excellent price-to-performance ratio. The Dell Dimension XPS R400, Gateway's closest competitor in hardware and speed, includes a larger hard disk (13.7GB) but costs nearly \$300 more.



The G6-400 performed well on all our benchmark tests. Equipped with an nVidia RIVA 128 AGP graphics chip set, the system was particularly adept on our ZD 3D WinMark 98 tests, scoring on a par with the Micron Millennia Xi 400 and the NEC Direction SPB 400. The G6-400's Toshiba DVD drive, capable of sharp, full-screen video playback, compared well even with standard CD-ROM drives on our CD-ROM WinMark 98 test.

Gateway accompanies this drive with a few DVD titles and a Boston Acoustics speaker system with a subwoofer. The machine's audio ports aren't clearly labeled, so you may have difficulty finding the speaker-out jack, but the speakers are otherwise easy to configure.

The company also offers a choice of Microsoft Office 97 Small Business Edition or the Home Essentials bundle coupled with one of three Microsoft

Choice software bundles (one aimed at business users, one at children, and one at gamers). The G6-400 is priced and configured to satisfy any home or small-business user.—CM

Gateway 2000 Inc., N. Sioux City, SD; 800-846-2000, 605-232-2000; www.gateway.com. Choose 539 at www.pcmag.com/infolink.

HP Brio PC 8532

Pentium II/400, 7.6GB hard disk, 15.8-inch monitor, SDRAM. Business Winstone 98 score: 23. \$2,480 street.

With Hewlett-Packard Co.'s Brio line of small-business PCs, the hook is exceptionally low prices. The new HP Brio PC 8532—a 400-MHz Pentium II with AGP graphics, a 32X CD-ROM drive, speakers, and a 56.6 K56flex modem—is only \$2,480, the lowest price in this roundup and \$170 below the next machine. Such pricing, however, is reflected in performance, which was also the lowest among the nine machines we tested.

Equipped with the same ATI 3D Rage Pro AGP chip set as the Acer and Compaq units, the 8532 was a below-average performer on both the 3D Win-

Mark and the 2-D-based Graphics WinMark tests. Its primary deficiency, however, lies in its BigFoot hard disk, a bulky piece of hardware that fills one of the system's front-accessible 5.25-inch bays (two front-accessible and two internal bays remain open for expansion).

Thanks in large part to this drive, the 8532 scored 43 percent below the average



Gateway G6-400



Pentium II/400, 9.6GB hard disk, 17-inch monitor, SDRAM. Business Winstone score: 27. \$2,954 direct.

As soon as a new processor makes its debut, Gateway 2000 invariably announces an able, affordable enthusiast PC that few vendors can equal. The Gateway G6-400, our Editors' Choice for this first wave of 400-MHz Pentium II PCs, lives up

S, M, L, XL, XXL.

Microsoft® Windows NT® Workstation gives everyone in your company what they need to work with. No more. No less.

With its flexible manageability, you can configure, customize, and lock down every Windows NT Workstation in your company right from your own desktop. Your high-end users get the multiple applications and flexible configurations they need. The troops get exactly the applications they need. And you get the control you need.

That's smart management. And it's good economics. A recent analyst report states that locked-down PCs running Windows NT Workstation offer a cost of ownership 35% lower than loosely managed PCs running Windows® 95—and even less than that of network computers. Yet as your costs drop, your end users move up to the speed, reliability, and security of Windows NT.

Visit us online and check out the Windows NT Workstation Zero Administration Kit. You'll see why Windows NT Workstation has become the compelling choice for every new desktop in your organization.

Windows NT[®]

Workstation 4.0



Where do you want to go today? **Microsoft[®]**

for this roundup during Disk WinMark testing and 12 percent below the average during Winstone testing. Even when the Dell Dimension XPS R400's Disk WinMark score is discounted (the Dell unit's score is inflated by a special device driver, the IOS0.VXD), the 8532's disk subsystem performance remains 35 percent below the roundup's average.

The machine's lone success during benchmark testing was the CD-ROM WinMark score, 20 percent above the average. The rest of the 8532's multimedia credentials are somewhat disappointing. HP includes neither DVD nor MPEG-2 support, and the unit lacks a subwoofer.

The 8532 also lacks an AGP slot (though it includes on-board AGP graphics), and it has only one available DIMM slot. Hewlett-Packard ships the system with a copy of Microsoft Word and a help application (the HP Brio Center), but the company does not provide 24-hour technical support or 24-hour turnaround on parts.

For additional functionality, the company does offer HP Value Packs, which can help you add easy-to-configure network cards, tape drives, or modems to your system.

As tested, the 8532 is inexpensive, but its performance suffers.—*CM*

Hewlett-Packard Co., Palo Alto, CA; 800-322-4772, 415-857-1501; fax, 800-333-1917; www.hp.com. Choose 540 at www.pcmag.com/infolink.

Micron Millennium Xi 400

*Pentium II/400, 9.6GB hard disk, 19-inch monitor, SDRAM. Business Winstone 98 score: 27.
\$3,399 direct.*

The Millennium Xi 400 from Micron Electronics goes beyond the call of duty with solid performance, AGP graphics, a second-generation DVD drive, a 19-inch monitor, and an Iomega Zip Drive, but it does so at this roundup's highest price.

Micron offers Millennium PCs for both home and small-business use and also offers ClientPro managed PCs and Powerdigm graphics workstations.

The Xi 400, using a Diamond Viper V330 AGP graphics card with 4MB of



SGRAM and an nVidia RIVA 128 graphics chip set, posted above-average results on our ZD 3D WinMark 98 test suite.

The unit posted average scores on our ZD Business Winstone 98 and Business Graphics WinMark 98 tests, but its DVD drive—like other DVD drives in this roundup—could not keep up with 32X CD-ROM drives on our ZD CD-ROM WinMark 98 test. The unit, which came with a 9.6GB, 7,200-rpm IBM Deskstar hard disk, posted a strong CPUmark₃₂ score and an above-average score on our ZD Business Disk WinMark 98 tests.

Attached to the graphics card is a Toshiba DVD drive and a Diamond Multimedia Maximum DVD decoder card that worked well on informal testing. Also included is a set of Advent AV390 speakers with a subwoofer, a motherboard-integrated Crystal 16-bit audio chip set with FM synthesis, a 56-Kbps U.S. Robotics fax modem, and Microsoft Office 97 Small Business Edition.

One thumbscrew unlocks the case, and the inside is roomy and easily accessible. Micron offers a five-year CPU and RAM warranty, a three-year warranty on parts, a year of free on-site service and 24-hour, 7-day, toll-free technical support.

First-time PC buyers will like the excellent manuals, poster-size quick-setup sheet, and Customer Resource Center CD-ROM, which includes component drivers and video tutorials. Anyone from a novice to a seasoned professional who can pay the price will be happy with

the Millennium Xi 400.—*Angela Tuka*
Micron Electronics Inc., Nampa, ID; 888-634-8799, 208-893-3343; fax, 208-893-3424; www.micronpc.com. Choose 541 at www.pcmag.com/infolink.

NEC Direction SPB 400

*Pentium II/400, 9.6GB hard disk, 17-inch monitor, SDRAM. Business Winstone 98 score: 27.
\$3,154 direct.*

With excellent 3-D graphics, disk, and CD-ROM performance, the NEC Direction SPB 400 from NEC Computer Systems Division is a good choice for most small-office and home computing demands.

The midtower product sits atop NEC's Direction series of small-office/home-office desktops. The company also offers the PowerMate line of commercial PCs and the Ready line of consumer PCs. NEC Computer Systems Division is a division of Packard Bell NEC Inc.

The SPB 400 came with a Diamond Multimedia Viper 330 AGP graphics card with 4MB of SGRAM and an nVidia RIVA 128 chip set. The Intel motherboard includes an integrated 16-bit Crystal wavetable audio subsystem. This setup left all three PCI slots open and one shared slot open. Also included were two Altec Lansing ACS45 compact speakers with a subwoofer, a 17-inch NEC C700 monitor, and Microsoft Office 97 Small Business Edition.

The SPB 400, configured with a 9.6GB IBM Deskstar 7,200-rpm ATA-4 hard disk and a 32X NEC CD-ROM drive, logged an above-average ZD Business Disk WinMark 98 score and the highest ZD CD-ROM WinMark 98 score in this roundup. The unit posted an above-average



DOUG HAS A SAFE PLACE FOR
E-MAILS FROM HIS SECRET ADMIRER.

NOW ALL HE NEEDS IS A SECRET ADMIRER.



Zip drives. The floppy to be proud of.
Model No. 3346 FS and 3346-001
for volume up to 100 MB.



Keeping e-mail on the office network is fine. Until you get a nasty note from the network manager telling you to clean up your files. That's when a Zip disk comes in handy. With the capacity of 70 floppies, a genuine 100MB Zip disk can keep thousands of e-mails and attachments handy. With over 10 million out there, you'll find Zip drives just about everywhere you go. In fact, most leading PC companies now offer ZIP BUILT-IN™ drives. Of course if you already have a computer, you can always buy an external Zip drive. That way, when you get an e-mail from that special someone, you'll have a special place to keep it. Get your Zip drive and Zip disks wherever you get computer products. Or check us out on the Web at: www.iomega.com/zip

Use only genuine Zip disks featuring
this symbol  in your Zip drive.

BECAUSE IT'S 



age score on our 3D WinMark tests and logged average scores on our Business Winstone 98 and Business Graphics WinMark 98 tests.

NEC bundles an excellent users' manual and the Product Recovery CD, which can restore all preinstalled software when necessary. NEC offers 24-hour toll-free technical support and backs the unit with a three-year warranty on parts and labor, plus a year of free on-site service. With good performance and solid support, the NEC Direction SPB 400 is a worthy choice.—*Robert S. Anthony*

NEC Computer Systems Division, Mountain View, CA; 888-863-2669, 978-264-8000; fax, 978-264-8673; www.nec-now.com. Choose 542 at www.pcmag.com/infolink.

Quantex QP6/400 SM-4x

*Pentium II/400, 8GB hard disk, 19-inch monitor, SDRAM. Business Winstone 98 score: 24.
\$2,649 direct.*

The QP6/400 SM-4x from Quantex Microsystems is a basic small-office/home-office system priced for those on a strict budget. The unit does offer handy features, and it yielded average scores on most of our performance tests. Besides the SM series of mainly small-business PCs, Quantex manufactures the home/value M series and the corporate SB line.

The SM-4x, configured with a 32X Toshiba CD-ROM, earned one of the highest scores in this roundup on our CD-ROM WinMark 98 test. But the unit, which has a Diamond Fire GL 1000 Pro AGP graphics card with 8MB of SGRAM and a Permedia2 graphics chip set, produced a below-average score on our 3D

WinMark 98 tests. The graphics card helped the unit to an average Business Graphics WinMark 98 score, however.

The system, with an Intel motherboard and an IBM Deskstar 8GB hard disk, posted average scores on our CPUmark₃₂ tests and a below-average score on our Business Disk WinMark 98 tests.

The SM-4x offers a good hardware bundle, including a 19-inch monitor, an Ensoniq 16-bit sound card, Altec Lansing ACS90 speakers, a 56-Kbps ViVA modem, and a wealth of business software including Microsoft Office 97 Small Business Edition. Also included was an Intel EtherExpress Pro/100+ 10/100-Mbps Ethernet card and two USB ports. The cover lifts off with the turn of three screws, and no wires or cables hinder access to bays, slots, sockets, or components. System guides, poster setup guides, and well-labeled ports will sufficiently help the user start up and maintain the QP6.

Quantex offers 24-hour, toll-free technical support and a three-year parts warranty with a year of on-site service. The QP6/400 SM-4x performs adequately, and its price and upgradability make it an eye-catching option.—*AT*

Quantex Microsystems Inc., Somerset, NJ; 800-346-6572, 732-563-4166; fax, 732-563-0407; www.quantex.com. Choose 543 at www.pcmag.com/infolink.

Sys Performance Pro 400BADD

*Pentium II/400, two 4.3GB hard disks, 17-inch monitor, SDRAM. Business Winstone 98 score: 28.
\$3,195 direct.*

With top-level graphics and audio hardware, the Sys Technology Performance Pro 400BADD is an impressive package, especially for game aficionados. Sys Technology's Performance line of mainstream Pentium- and Pentium II-class PCs sits above the Value Edition line of budget Pentium-class PCs and below the Premier line of Pentium II PCs with cutting-edge technology.

The 400BADD midtower was configured with two Seagate



4.3GB Ultra ATA hard disks, a 32X TEAC CD-ROM drive, a 3Com Fast EtherLink XL 10/100-Mbps Ethernet card, a U.S. Robotics Sportster 56-Kbps x2 fax modem, and two USB ports.

The 400BADD's muscle-bound graphics subsystem may be overkill for some. It consists of a Matrox Millennium II AGP graphics card with 8MB of WRAM connected to a Diamond Multimedia Monster 3D II PCI add-on card with 8MB of EDO DRAM (4MB frame buffer memory, 4MB texture memory). The system also has a Diamond Monster Sound M80 PCI 3D wavetable audio card, a 17-inch Sys monitor, and a set of Altec Lansing ACS425 speakers with an ACS250 subwoofer. Despite all this hardware, the unit still had one IRQ free.

Not surprising given its extra 3-D graphics hardware, the 400BADD posted the highest ZD 3D WinMark 98 score in this roundup. Its Matrox Millennium II card accelerated it to first place on our Business Graphics WinMark 98 tests. The unit also posted one of the best scores on our Business Winstone 98 tests. Its Business Disk WinMark 98 score was average, but its CD-ROM WinMark 98 score, though acceptable, was one of the lowest in this group.

Sys Technology offers a year of 24-hour, toll-free support, a six-year warranty on the CPU and RAM, and five years of free labor, and the company supports the warranties on third-party components. If you have the need for 3-D graphics muscle, this unit will fill the bill.—*RSA*

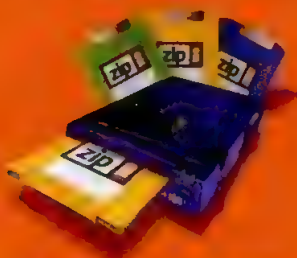
Sys Technology Inc., Cypress, CA; 800-613-9963, 714-821-3900; fax, 714-821-9592; www.systechnology.com. Choose 544 at www.pcmag.com/infolink. **PC**



HOW TO SAVE FILES THAT START WITH THE LETTERS WWW.



Zip, the stylized "Z" logo, Zip, and "Because It's Your Stuff" are registered trademarks, and ZIP BUILT-IN, the ZIP BUILT-IN logo, and "The Zip Guy" are trademarks of Iomega Corporation. *MSRP. MSRP price based on purchase of 10-pack. Actual prices may vary. See PC stores for ZIP BUILT-IN prices.



Zip drives, Zip BUILT-IN technology, and ZIP BUILT-IN logo are trademarks of Iomega Corporation. ©1998 Iomega Corporation. All rights reserved.



Ever wish you could record a Web site and surf it later? Your wish is granted. With the capacity of 70 floppies, a single 100MB Zip® disk is the perfect place to download stuff from the Internet. You can save Web-based stock quotes, investment profiles, articles, editorials, pictures, all kinds of stuff. Then you can surf, peruse, or analyze it all whenever you want. No messing with Web browsers, bookmarks, or Internet connections. Just pop your Zip disk into a Zip drive and start surfing your selections. And Zip drives are plentiful. With over 10 million out there, you'll find a Zip drive just about everywhere you go. In fact, most leading PC companies now offer ZIP BUILT-IN® drives. Of course if you already own a computer, you can always buy an external Zip drive. Then hop on the Web and download stuff from A to Z. Get your Zip drive and Zip disks wherever you get computer products. Or check us out on the Web at: www.iomega.com/zip

Use only genuine Zip disks featuring this symbol  in your Zip drive.

BECAUSE IT'S



Photography by Jeffrey Kreitzberg and Thom O'Connor

Network printers

By James Karney and M. David Stone

Today's shared printers deliver better speed and output. We test 17 monochrome and 9 color laser devices.

The familiar PC-industry refrain—better, faster, cheaper—applies to the newest crop of network laser printers, but this time around, it's only part of the story. In the past, selecting a new machine was easier than actually installing one. That's changing now. In addition, a new class of hybrid continues to emerge, blurring the line between office printer and office copier.

REVIEW CRITERIA PC Labs tested monochrome network laser printers with rated engine speeds of 12 pages per minute through 32 ppm and all networkable color laser printers—plus one solid-ink printer, from Tektronix, sold as a color-laser competitor. Products had to be new to the market since our roundups last year (“Print! Don’t Copy,” June 10, 1997, and “Clean, Crisp, & Color!”, October 21, 1997), though we invited back Editors’ Choice winners that are still on the market to gauge how they compare with the latest competitors.

A dozen companies submitted a total of 26 printers in the two categories (monochrome and color). Dataproducts, Genicom (which has purchased the printer divisions of Digital and Texas Instruments), Kyocera, and Sharp had eligible products in development but not ready in time for this roundup. Notably, Hewlett-Packard was preparing a replacement for its 24-ppm HP LaserJet 5si, a past Editors’ Choice winner, but could not release a production-level machine to us in time for this feature. In addition to the 26 traditional network printers, we tested two convergence prod-

ucts (from Canon and Xerox), each combining digital-copier and network-printer functionality in a modular, multifunction office appliance (see the sidebar “Copier Companies Fight Back”).

THE PAPERFUL OFFICE Though there are a host of factors to consider in picking the right printer for your network, speed is still chief among them. You need to be sure the printer is fast enough to handle user demand; otherwise it becomes a bottleneck—both for your network and for your workers.

A new wrinkle driving up the need for speed is the distribute-and-print model becoming prevalent in business. In the past, you would create a document, print it once, make copies, and distribute the document to those who needed it. E-mail and the Web are changing that paradigm: Now you send your electronic document via e-mail, and those who need a copy can just hit the Print button on their end. That saves a lot of unnecessary copying but drives up the use of shared printers. As for the Web, people aren’t just surfing the Internet, they’re printing it out—to share, to file, to read on the train home. Graphics- and gradient-filled Web pages can slow a printer to a crawl, while other users’ jobs get backed up.

The printers we tested for this roundup fall into three categories: small-workgroup, large-workgroup, and departmental.





Hardware

Mopier (which loosely stands for *multiple-original printer*) combined a 24-ppm departmental-class network printer with a host of paper-handling and finishing options, including collation and stapling. HP reasoned that instead of standing at the copy machine making sets of documents they had printed once on a laser, users could use the network printer like a network copier. They could simply have the printer print, collate, and staple as many sets as they needed, all from the comfort of their desks. Other vendors, including IBM, QMS, and Xerox, now offer printers with the ability to produce and finish multiple sets efficiently.

Clearly, copier companies weren't going to sit back as their market share was eroded by newfangled printers. Makers such as Canon, Konica, Ricoh, Sharp, and Xerox announced copiers that could connect to the network, each acting not only as a walk-up copier but as a network printer, scanner, and fax machine—a high-end multifunction printer, if you will. The idea became possible when copier makers switched to digital technology.

Digital copiers work by scanning originals into digital form before rendering copies on a computer-quality (usually laser) printer engine. IDC, a market research firm in Framingham, Massachusetts, expects digital copiers to outsell analog models by 2001. That means most of the copiers sold will be usable as network printers with the simple addition of network interface cards, and the line between copier and printer will blur even more.

OVER THE SPEED BUMP Beyond raw speed, there are a number of physical attributes you need to consider. First and foremost is the paper size a printer can produce. All can produce letter- or legal-size output, but if you have users who need to print desktop publishing output or oversize spreadsheets, you should consider a printer that delivers 11- by 17-inch ledger-size (also called tabloid-size) output. Of the 17 monochrome printers we tested, 9 support ledger-size paper (including two Editors' Choices, the IBM InfoPrint 20 and the Xerox DocuPrint N32); no color laser on the market yet handles 11-by-17 media.

Input capacity is another important feature. Ideally, a printer will come with at least 500 sheets (a ream) of input capacity stan-

Each of the 12-ppm units in the first category (about \$1,100 street) is suitable for a small office or workgroup of 5 to 10 users. To service up to 20 users, you'll want to consider a printer from the second category: 16 to 20 ppm (about \$1,600). If you want to share a printer among 21 users or more, you'll need a printer from the third category: a departmental-level unit rated at 24 to 32 ppm. At this level, your choices start to get interesting: Do you get a traditional network laser printer or one of the new networkable digital printers/copiers?

WHEN WORLDS COLLIDE Hewlett-Packard fired the first salvo two years ago, when it announced the HP LaserJet 5si Mopier. The

Our Contributors: JAMES KARNEY is a frequent contributor to *PC Magazine*. PADRAIC BOYLE, ALFRED POOR, WINN L. ROSCH, and M. DAVID STONE are contributing editors of *PC Magazine*. PATRICK NORTON and DENIS TOM are freelance writers. S. JAE YANG was the project leader, and senior associate editor JAMIE M. BSALES was in charge of this story.

IN THIS REVIEW

Monochrome Network Laser Printers	
Apple LaserWriter 8500	139
HP LaserJet 4000TN	139
HP LaserJet 5000GN	139
IBM InfoPrint 20	146
Lexmark Optra S1255n	148
Lexmark Optra S1625n	148
Lexmark Optra S1855n	148
Lexmark Optra S2455n	148
Minolta PageWorks 12	150
Minolta PageWorks 20	150
NEC SuperScript 1260	152
Okidata OkiPage 20DXn	152
QMS 2060 EX	154
QMS 2425 Turbo EX	154
Xerox Document Centre 230LP	154
Xerox DocuPrint N24	158
Xerox DocuPrint N32	158
Color Network Laser Printers	
Brother HL-2400CN	160
HP Color LaserJet 5M	160
Lexmark Optra SC1275n	162
Panasonic KX-P8410	168
Panasonic KX-PS8000	168
QMS magicolor 2 CX	168
QMS magicolor 2 EX	168
Tektronix Phaser 360	171
Tektronix Phaser 560	171

www.pcmag.com

Check out our interactive viewers and see which printers match your speed and features checklist.

dard, and the vendor should offer several high-capacity options to let you fill and forget. Multiple paper drawers will also let users select the paper size and type they need from an installed tray, instead of having to go to the printer and swap trays manually.

Another feature is duplexing. Printing on both sides of a page cuts your printing costs almost in half, since 50 percent of the cost of laser printing is in paper. Toner and other consumables typically run a penny per page if you buy the manufacturers' high-capacity toner cartridges. All the monochrome printers in this roundup except for the 12-ppm Minolta and NEC units can accept duplexers. None of the color lasers offer built-in duplexers.

Advanced paper-handling options such as those on the original Mopier have become common, at least on monochrome printers. Several of the units we tested offer sorters to collate jobs automatically (and four will staple them, too). Alternatively, the Xerox DocuPrint models offer a mailbox sorter. The network administrator can assign a particular bin to a user or a group, and their jobs automatically get deposited in that bin—no more flipping through a stack of output to find your resume.

One requirement for monochrome printers that used to be a major differentiator has become moot: print quality. All of the printers deliver at least 600-dpi resolution, and we found one printer's text output indistinguishable from another's. If your users do print graphics, a 1,200-dpi engine (available on nine of the monochrome lasers here) will deliver better though slower output.

COLOR COMES ON STRONG Unlike monochrome lasers, color lasers vary significantly in output quality, which makes output a key consideration in your choice. This year, all the color lasers we tested deliver acceptable output for color business graphics such as charts and presentation slides. But there are clear differences between good and better. The Brother HL-2500CN, for example, prints with obvious dithering patterns, whereas most other printers don't. And photos show greater differences. The best-looking output (from the Tektronix

Editors' Choice

- *Workgroup:* IBM InfoPrint 20, Lexmark Optra S1855n
- *Departmental:* Xerox DocuPrint N32
- *Color:* QMS magicolor 2 CX



Our testing turned up some new favorites among a very strong field. If you need a monochrome printer to

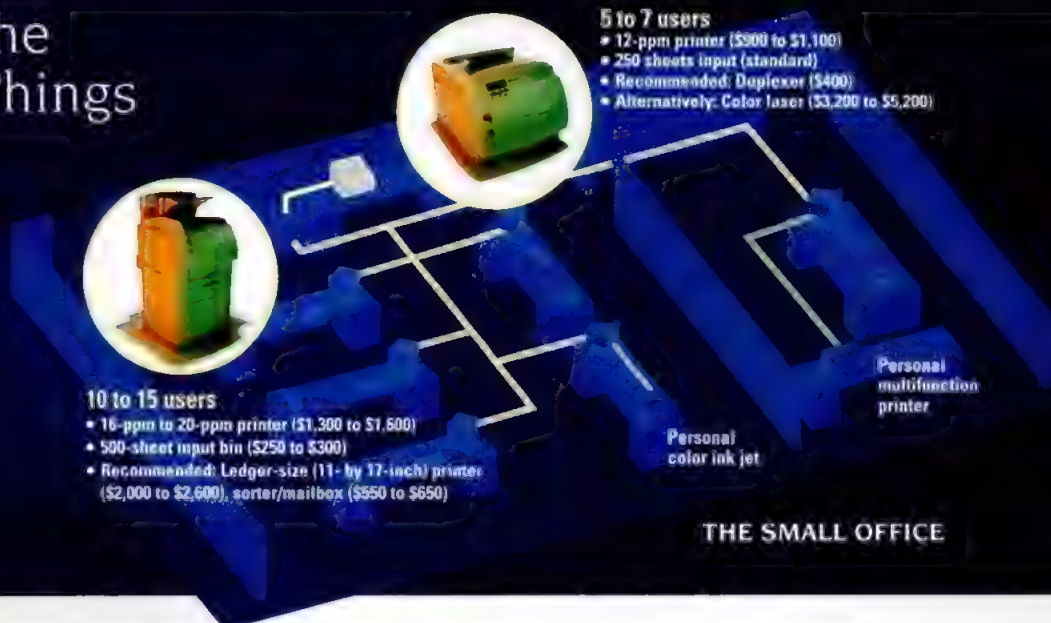
share in a medium-size office or workgroup (10 to 20 users) and want the added flexibility of oversize output, our Editors' Choice is the IBM InfoPrint 20 (\$1,780 street, including network adapter). This 20-ppm unit was quick on our performance tests, produced good-looking 600-dpi output, and offers a host of paper-handling options including a duplexersorter combination and a 2,000-sheet input hopper to augment its standard 650-sheet

Phaser 560) is close to true photographic quality—though for prepress proofing, no color laser can compare with a thermal dye printer (about \$10,000 street).

With color lasers, toner capacity, ease of toner replacement, and cost per page are also make-or-break propositions. For example, the 10,000 to 12,000 pages per cartridge for the Tektronix Phaser 560 and the two Panasonic printers make for a lot fewer trips to the consumables closet than the 3,000 pages per toner bottle for the HP Color LaserJet 5M. But the bottle makes for a lower cost per page: HP rates its cost for a color page with 10 percent coverage (a typical Excel page with a pie

Printers in the Scheme of Things

The network laser printers in this roundup vary widely in speed and capability, from 12-ppm monochrome units suitable for sharing by small workgroups to color models and 32-ppm multifunction devices that can serve as printers, office copiers, network scanners, and fax machines. Here's what a typical small office might need; we also describe the printers a larger corporate site might require.



capacity. Best of all, for a price premium of about \$200 over a legal-size printer, the InfoPrint delivers full-bleed 11-by-17 images (on media up to 13 by 19 inches), making it a good choice where users need to print desktop publishing output or large spreadsheets. IBM's fine Network Printer Management setup and administration utility, in both server- and Web-based versions, rounds out the package.

If you don't need oversize output, our Editors' Choice in the workgroup arena is the Lexmark Optra S1855n (\$1,490 street with Ethernet adapter). The Lexmark is fast, too, and it offers 1,200-dpi output for excellent text and graphics. Paper-handling options stack neatly and easily beneath the small-footprint chassis, and Lexmark's Mark Vision administration utility makes network setup a snap.

Two other workgroup printers are worth your attention. The legal-size HP LaserJet 4000TN (17 ppm, \$1,600 street) and ledger-size LaserJet 5000GN (16 ppm, \$2,600 street) are reasonably quick and deliver excellent 1,200-dpi output. HP's JetAdmin and Web JetAdmin setup and administration utilities lead all others for robustness, versatility, and ease of use.

For a speedier solution to share among an entire department (20 users or more), our Editors' Choice is the DocuPrint N32 from Xerox (\$2,900 street, including Ethernet adapter). Its 32-ppm engine blazed through our tests, and the N32 offers the

input capacity (1,050 sheets standard) and paper-handling options (duplexing, collating, and stapling) to make it a time-saving office appliance to grow into—all at an attractive price. And Xerox's CentreWare administration utility is as robust as HP's. The QMS 2425 Turbo EX (\$3,949 list), an upgraded version of the unit we awarded an Editors' Choice last year, is still a worthy contender and merits an honorable mention. Speed and robust paper handling make it a good choice for high-traffic networks.

Color laser printers have now become affordable enough that some small offices can deploy one as their only shared printer. None exemplify this more than our Editors' Choice in this category, the QMS magicolor 2 CX. At a \$3,200 street price—including the Ethernet adapter and 24MB of RAM (no hidden costs)—the magicolor is a real bargain. Its 16-ppm speed for monochrome and Crown architecture will keep typical black-and-white jobs humming off your network, and its 4-ppm rated speed for color should keep those jobs from becoming bottlenecks. Its 600-dpi output and good color quality should more than satisfy for proposals and presentations.

With 1,200-dpi output, our Editors' Choice from last year, the Tektronix Phaser 560 (\$4,500 street with adapter), is still worth a look if you intend to print a lot of photos. Unfortunately, the unit's networking and administration support isn't as robust as those of printers from HP, Lexmark, QMS, and others.

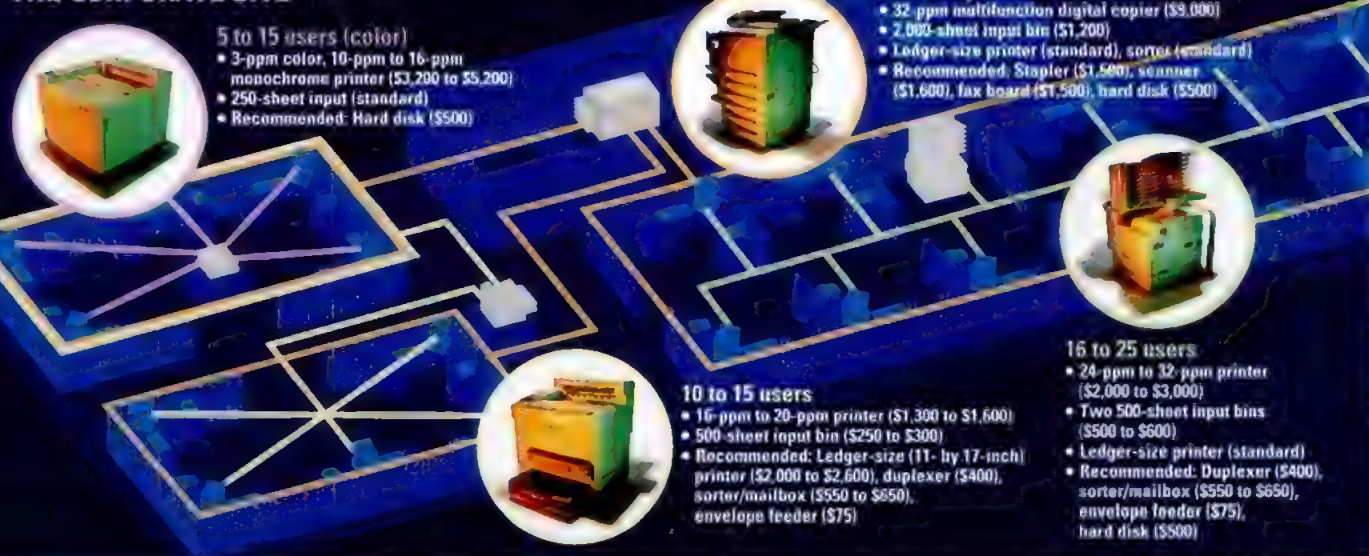
chart) at 3.3 cents; the competitors' costs range from 5 to 8 cents. And since a color laser will still be used on a network, pay close attention to the administration side. For example, our Editors' Choice in this category—the QMS magicolor 2 CX—delivers merely good output, but with outstanding networking support and networked performance.

KEEPING THE NETWORK IN NETWORK PRINTER With a network printer, the printer hardware itself is only half the story. MIS professionals will want to check out a vendor's network-protocol support and administration tools. All of the printers we test-

ed can be hosted on a NetWare or Microsoft Windows NT server, and most support Unix flavors, OS/2, and Mac as well. If you have a mixed networking environment, be sure the printer can support two network cards.

On the administration side, HP, IBM, Lexmark, QMS, and Xerox deliver robust utilities that make configuring and administering your network-printer resources a snap. The first, and still the best, is HP's JetAdmin. This utility's Wizards walk you through the process of setting up the printer on your network (assigning IP addresses, setting up print queues, and much more). It can also be set to poll HP's Web site periodically to update

THE CORPORATE SITE



Personal leasing arranged by Dell Financial Services L.P., an independent entity, to qualified customers. Amount of monthly lease payments above are based upon 24-month lease. All above monthly lease payments exclude taxes which may vary; (for example, Hartford City, IN sales tax: \$7.57/month); shipping cost due with first payment, no security deposit required, subject to credit approval and availability. Lease terms subject to change without notice.

DELL INSPIRON™ HIGH-PERFORMANCE NOTEBOOKS

Common features: ♦ Modular Options Bay accepts 24X Max™ Variable CD-ROM 3.5" Floppy Drive (both included) or Optional 2nd Smart Li-Ion Battery ♦ 512KB L2 Pipeline Burst Cache ♦ Stereo Speakers with 3D Surround Sound and Yamaha Software Wavetable ♦ Smart Lithium Ion Battery ♦ Zoom Video and USB Ports ♦ Cardbus Ready/Fast IR1.1 ♦ MS Windows 95 ♦ **FREE MS Windows 98 Upgrade Packet** ♦ MS IE ♦ Touchpad ♦ Extendable 1-Year Limited Warranty*

NEW DELL INSPIRON 3200 D266XT 266MHz PENTIUM II PROCESSOR FEATURING MMX TECHNOLOGY

Common features listed above plus:

- 13.3" XGA Active Matrix TFT Display
- 96MB SDRAM Memory
- 4GB Ultra ATA Hard Drive
- 128-bit Graphics Accelerator with 65K Colors at 1024x768
- Leather Carrying Case
- MS Office 97 Small Business Edition
- 6.9 Pounds*

★ Upgrade to 144MB SDRAM, add \$11.32 per month.
★ 3Com 10/100 Fast Ethernet Adapter, add \$6.40 per month.

\$129 Mo. Business Lease
36 Mos.

or buy today for \$3499
Order Code #890423

NEW DELL INSPIRON 3200 D233XT 233MHz PENTIUM II PROCESSOR FEATURING MMX TECHNOLOGY

Common features listed above plus:

- 13.3" XGA Active Matrix TFT Display
- 64MB SDRAM Memory
- 3.2GB Ultra ATA Hard Drive
- 128-bit Graphics Accelerator with 65K Colors at 1024x768
- 56K Capable** x2 Modem
- Leather Carrying Case
- MS Office 97 Small Business Edition
- 6.9 Pounds*

★ Upgrade to a 266MHz Pentium II Processor, add \$7.57 per month.

\$119 Mo. Business Lease
36 Mos.

or buy today for \$3199
Order Code #890425

DELL INSPIRON 3000 M233XT 233MHz PENTIUM PROCESSOR WITH MMX TECHNOLOGY

Common features listed above plus:

- 13.3" XGA Active Matrix TFT Display
- 32MB SDRAM Memory
- 3.2GB Ultra ATA Hard Drive
- 128-bit Graphics Accelerator with 65K Colors at 1024x768
- MS Office 97 Small Business Edition
- 6.9 Pounds*

★ Upgrade to a 266MHz Pentium Processor, add \$3.78 per month.
★ Upgrade to 64MB SDRAM, add \$7.53 per month.

\$99 Mo. Business Lease
36 Mos.

or buy today for \$2599
Order Code #890427

DELL INSPIRON 3000 M200ST 200MHz PENTIUM PROCESSOR WITH MMX TECHNOLOGY

Common features listed above plus:

- 12.1" SVGA Active Matrix TFT Display
- 32MB SDRAM Memory
- 2.1GB Ultra ATA Hard Drive
- 128-bit Graphics Accelerator with 16 Million Colors at 800x600
- MS Office 97 Small Business Edition
- 6.4 Pounds*

★ Upgrade to a 233MHz Pentium Processor, add \$7.57 per month.
★ Upgrade to 64MB SDRAM, add \$7.53 per month.

\$79 Mo. Business Lease
36 Mos.

or buy today for \$2099
Order Code #890429

GET THE LEASED COMPUTER.

DELL POWEREDGE™ SERVERS

Common features: ♦ 512KB Integrated L2 ECC Cache ♦ Integrated PCI Ultra-Wide SCSI-3 Controller ♦ Intel Pro/100B PCI Ethernet Adapter ♦ HP OpenView™ NNM Special Edition ♦ 24X Max™ Variable SCSI CD-ROM Drive

DELL POWEREDGE Z200 SERVER NEW 333MHz PENTIUM II PROCESSOR DUAL PROCESSOR, RAID CAPABLE WORKGROUP SERVER

Common features listed above plus:

- 96MB ECC EDO Memory
- 9GB Ultra-Wide SCSI-3 Hard Drive (7200 rpm)
- 12/24GB Variable SCSI DAT Tape Backup Unit
- 6 Expansion Slots: 3 PCI/3 EISA
- 6 Drive Bays: 3 External 5.25"/3 Internal 3.5"
- 3-Year Next-Business-Day On-site* Service
- 7x24 Dedicated Server Hardware Technical Telephone Support

\$159 Mo. Business Lease
36 Mos.

or buy today for \$4304
Order Code #250126

DELL POWEREDGE Z200 SERVER 233MHz PENTIUM II PROCESSOR DUAL PROCESSOR, RAID CAPABLE WORKGROUP SERVER

Common features listed above plus:

- 64MB ECC EDO Memory
- 4GB Ultra-Wide SCSI-3 Hard Drive (7200 rpm)
- MS Windows NT® Server 4.0 (10 Client Access Licenses)
- 6 Expansion Slots: 3 PCI/3 EISA
- 6 Drive Bays: 3 External 5.25"/3 Internal 3.5"
- 3-Year Next-Business-Day On-site* Service
- 7x24 Dedicated Server Hardware Technical Telephone Support

\$119 Mo. Business Lease
36 Mos.

or buy today for \$3214
Order Code #250125

Who says you have to buy a great computer in order to have a great computer? Now, in addition to the Dell® business lease program,* we've got an attractive personal leasing arrangement,** too.

If you qualify, you can get a 24- or 36-month personal lease on a Dell Dimension® desktop, or a Dell Inspiron™ notebook. Or you can choose a 24- or 36-month business lease on any Dell Dimension desktop, Dell Latitude® or Inspiron notebook, Dell WorkStation or Dell PowerEdge® server. With all the performance, none of the commitment, and the benefit of Dell's award-winning service and support.

When the lease is up, you'll have several options: Return the computer and lease a new one,** buy it or simply return it.† Whatever you decide, you'll find it to be the perfect cure for your fear of computer commitment. Now no payments for 30 days on Business® and Personal® leasing programs.

Call or visit our website for more details. Really. It's the leased you could do.

DELL

TO ORDER TOLL-FREE

800-626-4817

TO ORDER ONLINE

www.dell.com/buydell

Mon-Fri 7am-11pm CT • Sat-Sun 8am-8pm CT

In Canada,* call 800-233-0702

GSA Contract #GS-35F-4076D

Keycode #04707

to receive featured configuration and pricing.

**ONLINE
24 HOURS
A DAY**

ACCESS SPECIAL PROMOTIONS
DESIGN YOUR IDEAL COMPUTER
CHECK THE STATUS OF YOUR ORDER
ACCESS 24HR ONLINE TECH SUPPORT

Copier Companies Fight Back

So, is a network printer right for you—or is one of the new networkable digital copiers? To gauge the offerings, we looked at two of the leaders: Canon's GP-200F and the Xerox Document Centre 230ST. The two are well matched in their feature sets, though each has its own individual strengths.

Canon, traditionally regarded as a copier company, builds the **Canon GP-200F** on a copier foundation, and a good one at that. The copier can digitally rotate, enlarge (to 800 percent in 1 percent increments), or reduce (to 25 percent) images. From the \$5,995 list price of the basic copier, the various networking, paper-handling, and scanning improvements pushed the multifunction model we examined to \$18,900. For setup and administration, the GP-200F software is both friendly and thorough. It not only controls all GP-200F features and the print queue, but it also provides in-depth monitoring of the system's operation, including reporting paper and toner levels in discrete increments.

Although the intricacies of the backlit LCD control panel on the printer itself may take getting used to, the basic functions (copy, fax, and print) have dedicated buttons that make access easy even for unskilled users. The GP-200F approaches its 20-ppm rating on long print jobs, collates into 12 individual trays (a \$2,900 option), and can staple up to 25 pages per bin. Although its priorities are adjustable, its default setting gives priority to copying. When you press the bold Copy button, any active print job goes on hold, the copies

roll out to a separate tray, and then the print job swiftly and automatically resumes. Incoming fax jobs can be similarly programmed to interrupt printing, although the machine can send faxes and print simultaneously. The GP-200F falters only as a stand-alone scanner. It requires a separate SCSI connection, and it can't send its 600-dpi gray-scale images directly through its network connection. (Canon U.S.A. Inc., Networked Office Systems Division, Lake Success, NY; 800-652-2666; www.usa.canon.com. Choose 522 at www.pcmag.com/infolink.)

Knowing that copiers often have a reputation for poor reliability where computer printers do not, Xerox distinguishes the **Xerox Document Centre 230ST** by building it on a printer foundation rather than a copier foundation. The base copier/printer lists for \$14,995; fully configured (with network faxing, network scanning, duplexing, sorting, and stapling), our unit approached \$20,000.

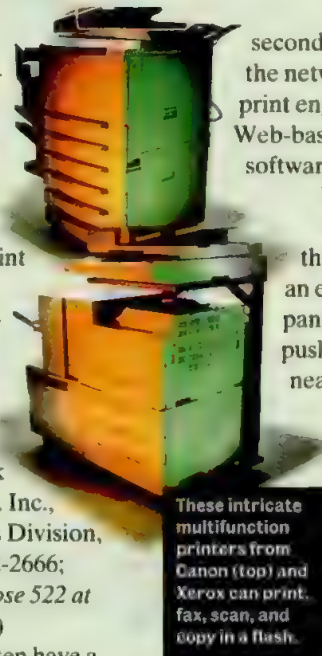
The Xerox design capitalizes on its digital technology to make the machine modular. The print engine is tied to the scanner/copier by nothing more than a few cables, and the modules get bolted together with an external steel skeleton. The resulting package has much to praise: the lickety-split 400-dpi gray-scale scanner (which captures a full-sheet image in a bit more than a

second and whisks it across the network), a superb 30-ppm print engine, and excellent Web-based administration software.

Xerox centralizes all hardware control on the scanner/copier, using an elaborate backlit LCD panel with a multitude of push buttons regimented in neat little rows. A more thorough control system is hardly conceivable, although a simpler one might be more pleasant. The Windows- or Web-based administration software is thorough, although monitoring

could be more detailed. (The program could report the actual level of toner, for example, instead of merely waiting for it to run out before giving an out-of-toner message.)

Considering the different foundations used by the two machines, the bottom line should hardly be a surprise: Xerox makes a better printer and scanner, but Canon has created a friendlier office copier. The Canon GP-200F is more accessible to less-skilled users, but Xerox wins for raw speed and better network integration across its functions. (Xerox Corp., Document Products Group, Rochester, NY; 800-275-9376; www.xerox.com. Choose 532 at www.pcmag.com/infolink.)—Winn L. Rosch



These intricate multifunction printers from Canon (top) and Xerox can print, fax, scan, and copy in a flash.

drivers. Once the printers are up and running, JetAdmin lets you check a printer's status (online status, paper, toner) and change settings from the intuitive graphical interface. With the HP, IBM, and QMS applets, you can even track usage by individual or department, for bill-back purposes or to determine whether you've deployed the printer resources most efficiently.

The major players, again led by HP, are adding browser-based software that lets you view, configure, and control any supported device either locally or over the Internet. Such browser-based solutions will become increasingly important in the network scheme, as more network devices—including hubs and UPSs—offer such support.

Not all the networking advances are coming from manufacturers. Novell is simplifying the process of adding and managing printers on its networks with NDPS (Novell Distributed Print Services). This software solution places all printer, print queue, print server, and spooler functions into a single unit manageable under NDS (NetWare Directory Services). It works with all printers, and HP and Xerox have gone farther by providing gateways that permit bidirectional communications and management of NDPS printers from a single administration utility. So whether you're looking at monochrome or color (or a few of each), the reviews and test results that follow should help whittle down your shopping list.

Monochrome Laser Printers

Apple LaserWriter 8500

Ledger-capable 20-ppm monochrome laser; 600 by 600 dpi; 650-sheet input; \$1,999 list. Tested options: 500-sheet paper tray, \$279; envelope feeder, \$149; duplexer, \$349.

The top-of-the-line Apple LaserWriter 8500 offers an organic shape and soft-green plastic accents that make it a shoo-in as the most stylish printer of this group. With PostScript 3 support, ledger-size printing, and an excellent optional duplexer, it's packed with features well suited for medium-size workgroups. But its management features and its speed-test performance lagged behind the Editors' Choice-winning IBM InfoPrint 20, which is built around the same print engine.

Setting up the LaserWriter was surprisingly difficult. Neither we nor Apple technicians were able to install it on a NetWare network using PConsole; we were forced to use the less robust Apple LaserWriter utility. Once the printer was installed, we found its management interface cumbersome. Although you can set passwords for securing your settings, there's no easy way to access the printer's configuration. The LaserWriter utility does let you configure ports and gray-scale options, as well as download PostScript fonts and adjust print density. You can also use it to manage other vendors' printers if you know their IP addresses.

Physically setting up the printer was a snap, and adding the optional 500-sheet paper tray and duplexer was a simple matter. The LaserWriter delivered excellent output quality on our tests. Text and graphics were exceedingly crisp and detailed, with just a bit of white on the edges of some fills. Two new proprietary technologies aided output: PhotoGrade—which increases the number of gray shades in an image to give the appearance of a much higher resolution—and FinePrint, which lets the printer produce dots of various widths to help reduce the risk of jagged edges. In performance testing, the LaserWriter's speed was about average among its peers for single jobs. The printer slowed down considerably, however, when we sent it multiple jobs simultaneously or asked for multiple copies of a single job—tasks that are very common in a midsize workgroup.

Robust network management, fast print speeds, and attractive output keep HP's LaserJet 5000GN (top) and LaserJet 4000TN (bottom) in the running. But neither unit could surpass the value and feature set of our Editors' Choice winner, the IBM InfoPrint 20.

Although the LaserWriter 8500's excellent output compares well, its spotty performance and cumbersome management tools for PC networks are still tough to overlook. —Patrick Norton

Apple Computer Inc., Cupertino, CA; 408-996-1010; www.imaging.apple.com. Choose 520 at www.pcmag.com/infolink.

HP LaserJet 4000TN, 5000GN

4000TN: Legal-size 17-ppm monochrome laser; 1,200 by 1,200 dpi; 600-sheet input. \$1,600 street. Tested options: Duplexer, \$400.

5000GN: Ledger-size 16-ppm monochrome laser; 1,200 by 1,200 dpi; 850-sheet input. \$2,600 street.

HP's new LaserJet 4000TN and LaserJet 5000GN share a family resemblance and many of the same features. Both are

targeted at midsize workgroups and small businesses, both are aggressively priced, and both are excellent performers worthy of your close attention. The 4000TN is the right choice for users who don't need ledger-size (11- by 17-inch) printing; if your budget allows, opt for the 5000GN and the flexibility of a ledger-capable machine. These models introduce HP's new nomenclature, as the company moves away from single-digit numerics for its network-level lasers.

HP's class-leading network installation software gives new meaning to the wizard concept. The program automatically identifies as many configuration settings as it can from your computer's Registry and other files. For example, it knows which operating system is installed—Windows 95, Windows NT, or Windows 3.x—and which language you're using—English, French, and so on. The program can also find the printer on the network, create queues on servers, and streamline other tasks that usually take many steps and require the user to enter detailed configuration data.

The printers also come with HP's Web JetAdmin, a Web-based configuration and management utility that offers all the functionality of the server-based version. In addition to making it easy to set up the printers, this handy utility lets you use your browser to configure, monitor, and diagnose the printers on your network. You can even create a custom bitmap layout to map the device locations. This lets MIS personnel check on printer status from anywhere they happen to be in the field, not just from the server where JetAdmin is installed. Another handy Web-related applet is Internet Installer, which can automatically log on to the Internet at intervals you specify to update your drivers and other software, so that you're sure to be using the latest ver-

PERFORMANCE TESTS

Monochrome Network Printers



The QMS 2060 EX and the IBM InfoPrint 20 led the large-workgroup category. The Xerox DocuPrint N32 was the departmental champion.

What the Numbers Mean

When analyzing and comparing network printers, there's more to keep in mind than just the vendors' rated print speeds. In order to ensure real-world relevance in our simulations, we asked vendors to submit each product in a "typical" configuration, even if this was not the most basic version available. We also asked them to set up their printers on our test networks in the same way they would be configured in the

real world. On our tests, we measured "click-to-clunk" time, or how long it takes from the moment you click the OK button in the print dialog box to the moment the last page is released to the output tray. We then calculated a printer's *effective ppm* (pages per minute) on each test, a calculation that includes the first-page-out delay at the beginning of each print job.

50-Page Text The 50-Page Text test is a good indicator of a printer's raw engine speed. Using a Microsoft Word document that consists mostly of text and yields a highly compressible print job, this test puts most of its stress on the printer and less on the network, so activities that engage the print engine dominate the measured time. As we expected, the results tracked closely with the printers' page-per-minute (ppm) ratings.

There was little variation among the three

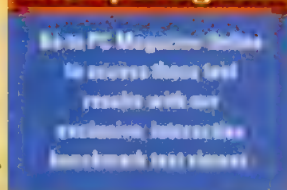
small workgroup-class printers that shared a rated speed of 12 ppm. Each produced the document at a rate of about 11 ppm.

The large workgroup printers ranged in claimed speed from 16 to 20 ppm. Naturally, the 20-ppm printers dominated the field on this test, although these units did not live up to their claimed speed in our labs. The QMS 2060 EX and the Editors' Choice-winning IBM Info-

Print 20 led the way at 17 ppm, followed closely at 16 ppm by the Apple LaserWriter 8500 (which was rated at 20 ppm) and the Editors' Choice-winning Lexmark Optra S1855n (rated at 18 ppm).

The departmental-class printers in this roundup are rated at 24 to 32 ppm. Although these entries demonstrated the fastest flat-out performance, they were the most disappointing in terms of living up to their ppm ratings. The best in the category

www.pcmag.com



Bold type denotes first place within each category
Effective ppm

SMALL-WORKGROUP PRINTERS

	Rated speed	50-Page Text	12-Page Text	12-Page Text and Graphics
Lexmark Optra S1255n	12 ppm	11.0	9.7	7.9
Minolta PageWorks 12	12 ppm	10.5	10.1	4.1
NEC SuperScript 1260	12 ppm	11.0	8.6	7.5
LARGE-WORKGROUP PRINTERS				
Apple LaserWriter 8500	20 ppm	16.4	13.1	11.4
HP LaserJet 4000TN	17 ppm	14.7	13.1	9.6
HP LaserJet 5000GN	16 ppm	14.6	12.2	9.2
IBM InfoPrint 20	20 ppm	17.1	12.3	11.5
Lexmark Optra S1625n	16 ppm	14.4	12.6	9.9
Lexmark Optra S1855n	18 ppm	16.2	14.4	11.1
Minolta PageWorks 20	20 ppm	15.7	13.8	5.3
Okidata Okipage 20DXn	20 ppm	15.1	13.1	5.7
QMS 2060 EX	20 ppm	17.1	13.7	12.3
DEPARTMENTAL PRINTERS				
Lexmark Optra S2455n	24 ppm	18.1	16.1	12.4
QMS 2425 Turbo EX	24 ppm	19.5	16.5	13.3
Xerox DocuPrint N24	24 ppm	18.6	15.3	13.3
Xerox DocuPrint N32	32 ppm	18.0	16.7	19.0
Xerox Document Centre 230LP	30 ppm	22.1	18.0	10.9
MULTIFUNCTION PRINTERS				
Canon GP-200F	30 ppm	18.1	13.2	4.8
Xerox Document WorkCentre 230ST	30 ppm	22.2	16.0	11.1

BETTER ►

BETTER ►

BETTER ►

BETTER ►

N/A* Not applicable—The printer does not support the Direct Print feature. N/A** Not applicable—The printer could not create multiple copies on our test. N/A? Not applicable—We did not run the test on this printer.

was the Xerox Document Centre 230LP, which printed at more than 23 ppm, 23 percent short of its 30-ppm rating.

12-Page Text Since most print jobs in real-life office environments are small documents, the first-page-out delay inherent in each job is vital information for properly evaluating network printers. Among the small workgroup printers, the Minolta PageWorks 12 and the Lexmark Optra S1255n showed the most strength in printing small text jobs, with 10-ppm performance. The NEC SuperScript 1260, however, had a 26-second initial delay for each document, which constituted 31 percent of the total time it took to print our 12-page text file. Such delays translated to an approximately 20 percent loss in performance when printing small jobs, compared with large jobs like the 50-page test document. In the large workgroup category, the 20-ppm-rated Okidata OkiPage 20DXn was the fastest on the 12-page test, at 17 ppm—partly a result of its quick first-page-out time.

High-capacity departmental printers are optimized for sustaining fast print speeds while producing continuous jobs and thus

are not ideal for occasional small jobs, or even designed for them. This was borne out by the high-end printers' results on our 12-Page Text Document test: 34 to 47 percent of the click-to-clunk time was taken up by first-page-out latency periods.

12-Page Text and Graphics Many of the documents that business and home users print out include graphics as well as text. Our 12-Page Text and Graphics test is designed to measure each printer's performance in such a real-world scenario. More important, by comparing results on this test with results on the 12-Page Text test, we can see the slowing effect that complex graphics processing has on the speed of the print engine. Performance here is mainly attributable to driver efficiency, the printer CPU's rasterization performance, and network proficiency. Adding more RAM to the printer helps reduce the networking overhead in transporting print job data.

In the small-workgroup category, both the Lexmark S1255n and the NEC SuperScript 1260 showed strong performance in rendering graphics images onto paper, performing at 8 ppm in both cases. Com-

pared with the text-only results, that is only an 8 percent slowdown for NEC and a 19 percent slowdown for Lexmark. By contrast, the Minolta PageWorks 12—the fastest text printer overall in the small workgroup category—did poorly on this test. The unit's Intel i960/33 processor and 4MB of memory were outclassed by competitors, leading to a 60 percent performance hit when printing graphical elements.

Among the large-workgroup printers, the QMS 2060 EX was a standout, thanks to its 12-ppm print speed, only 8 percent below its text-only performance. It came loaded with a 133-MHz NEC VR processor and 48MB of memory. The QMS was trailed closely by the Editors' Choice-winning IBM InfoPrint 20 and the Apple LaserWriter 8500. Unfortunately, entries from Okidata and Minolta bundled slow processors and fared dismally—at 6.7 ppm and 5.9 ppm, respectively—making them unfit for workgroups that print graphics-intensive documents.

Xerox's departmental-class DocuPrint N32 (also an Editors' Choice pick) posted the fastest score in the roundup by a wide



PERFORMANCE TESTS

margin, at 18.9 ppm. The Xerox Document Centre 230LP yielded a disappointing result of only 10.9 ppm, 30 percent below its text-only performance.

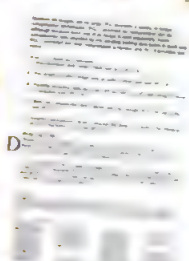
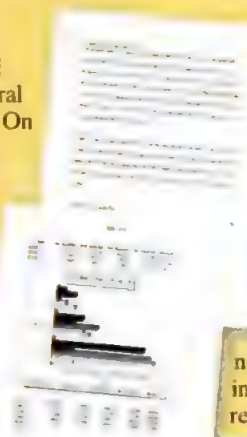
Multiple Copies Every networked office printer needs to generate several copies of a single job once in a while. On this timed test, printers bundled with hardware-based collation capability naturally had an advantage. When this feature was not available, however, we used Word 97's collation function, which simply replicates the print job into multiple jobs and sends all of them through the print spool server—thus bogging down the network and the printer's memory.

The Lexmark Optra S1255n was the only small-workgroup printer to perform well on this test, thanks to its hardware collation feature. The QMS 2060 EX and the IBM InfoPrint 20, both of which bundled hardware collation and large amounts of memory, came out on top in the large-workgroup category. The departmental printers, which we expected to shine on this test, displayed acceptable performance, but the Xerox DocuPrint N32 outclassed them all with a blazing 27.1-ppm result.

Multiple Simultaneous Jobs The Multiple Simultaneous Jobs test measures how fast the printer can clear the print queue and process a steady stream of print jobs. The test simulates a busy network environment, where multiple print jobs are sent to the print spooler at the same time. Results from this test do not include the first-page-out latency.

Although small-workgroup printers are not often expected to handle continuous print jobs, both the Lexmark Optra S1255n and the NEC SuperScript 1260 handled the workload without significant performance degradation. In the large workgroup category, the QMS 2060 EX and the Editors' Choice—winning IBM InfoPrint 20 were the winners, thanks to their ample memory. The printers from Minolta and Okidata fared poorly on this test because of their deficiency in handling graphical elements. None of the departmental printers had trouble surpassing at least 20 ppm on this test. Among them, the Xerox DocuPrint

N32—an Editors' Choice—stood out as the best, at a measured 24 ppm.



To test the printers under real-world conditions, we created files in typical business applications: portions of the 12-Page Text test document, the 2-Page Spreadsheet, and the 12-Page Text and Graphics file.

Direct Print Direct Print is a feature that allows client PCs on a network to communicate directly with the printer without going through a server. The feature is especially useful for small workgroup environments with only a few concurrent users. Direct Print also reduces overall network traffic by eliminating one segment of print-related network communication from the client to the server. As we expected, we saw little effect on performance from this feature in an isolated network setting. The Lexmark Optra S1255n and S2455n showed the most dramatic improvement (20 percent) from this feature when printing the 12-page text-and-graphics document, which is more network-bound than the 50-page text document.—*Analysis written by S. Jae Yang*

How We Tested

We ran all performance tests on a standard isolated Ethernet network, consisting of one server and two clients connected via a 3Com OfficeConnect hub. We used a Pentium II/300-based NEC Direction SPL 300 with 128MB of RAM as the print spool server; the server's 6GB IBM Deskstar EIDE hard disk was loaded with Novell's IntranetWare 4.11. For clients, we used two Pentium/166-based Micron Millennia machines, each with 32MB of RAM and a 2GB Western Digital Caviar EIDE hard disk; the clients ran Microsoft Windows 95 OSR 2 and Novell Client32. We set the clients' Diamond Stealth 3D 2000 graphics cards to display 1,024-by-768 resolution at 24-bit color depth. Both the clients and the server had 3Com EtherLink III Ethernet adapters installed.

A specific queue was set up for each printer, and the print server was set to poll the NetWare queue every second. To

create a realistic test environment, client spooling was enabled and set to "raw," and the driver was set to start printing immediately when the first page was spooled. To ensure reproducibility of data, the clients and the printer undergoing testing were restarted between test runs, and the printer's power management was disabled. Each printer was installed on the network in NDS mode unless the printer supported only bindery mode. We tested each printer with driver and settings recommended by the vendor.

For the **50-Page Text** test, we print out a 50-page Microsoft Word 97 document consisting mostly of text and some simple, highly compressible graphics.

For the **12-Page Text** test, we measure a printer's speed in producing a Word 97 text document consisting purely of unformatted text. The document contains 12-point Arial, Times New Roman, and Courier TrueType fonts, unstyled.

The **12-Page Text and Graphics** test measures a printer's speed in producing a Word 97 document with heavily formatted text and graphics. The graphics consist of two half-page bitmapped images—one a photograph, the other an image with a large amount of black.

The **2-Page Spreadsheet** test measures a printer's speed in producing a two-page Microsoft Excel spreadsheet that contains tables, a bar graph, a line graph, and a pie chart.

The **Multiple Copies** test measures a printer's speed in producing our 12-page formatted text-and-graphics document five times, collated. For printers that don't offer internal collation, we enable the collation feature in Microsoft Word. For printers that do, we turn off Word's collation feature.

The **Multiple Simultaneous Jobs** test measures how well a printer's NIC processes a steady stream of data. We take the printer off-line, then send our 12-page formatted document to the printer five times. The recorded times do not include the time each job takes to spool to the queue.

The **50-Page Direct Print** test measures a printer's speed in producing our 50-page unformatted text document from Microsoft Word using the printer's Direct Print feature (bypassing the server), if the unit supports this feature.

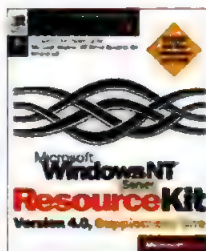
The **12-Page Direct Print** test measures a printer's speed in producing our 12-page formatted text and graphics document from Microsoft Word using the printer's Direct Print feature (bypassing the server), if the unit supports this feature.

Real test.



These Microsoft Press® training kits will help you quickly acquire the vital Windows NT® skills you'll need on the job, and they'll prepare you for the real test—the Microsoft® Certified Professional exams or the Microsoft Certified System Engineer exams.

Real world.



If you are responsible for rolling out, supporting, or integrating Microsoft Windows NT in a networked or otherwise multi-user environment, trust these superior-quality resource kits—packed with the “straight-from-the-source” information you need in the real world.

For the fastest and easiest access to the most up-to-date content, tools, and utilities directly from the source, visit ResourceLink—the “essential extension” to the Windows NT resource kits—at mspress.microsoft.com/reslink/



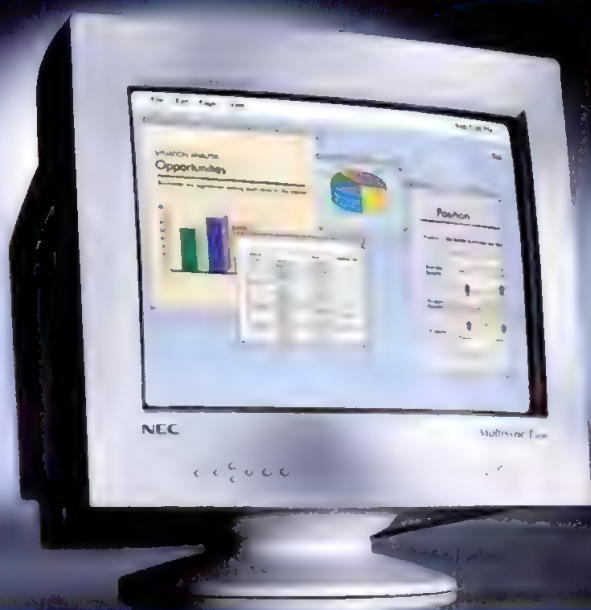
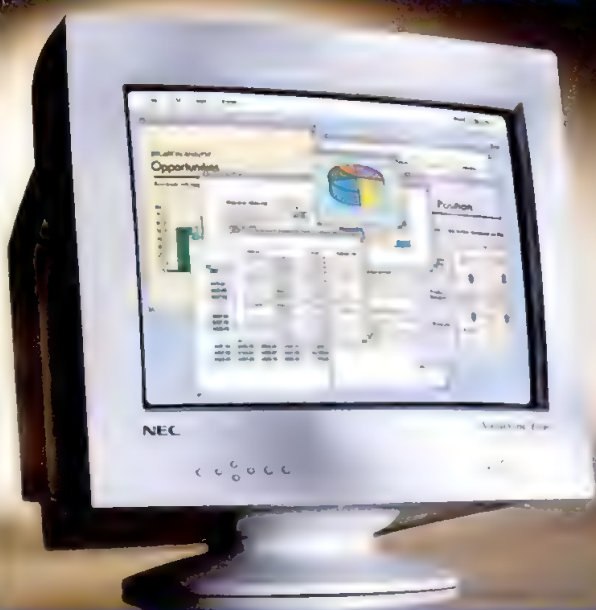
**Start faster and go farther—
with Microsoft Press training and
resource kits for Microsoft Windows NT.**

Available in quality bookstores and computer stores worldwide. To locate your nearest source for Microsoft Press products, reach us at: 1-800-MSPRESS in the U.S., or mspress.microsoft.com

Where do you want to go today?®

Microsoft® Press
mspress.microsoft.com

*MS stands for viewable image size. MultiSync and ChromaClear are registered trademarks and E500, E700, E1100, "Expect more. Experience more." and the NEC Technologies icon are trademarks of NEC Technologies, Inc. All other trademarks or registered trademarks are the property of their respective holders. ©1998 NEC Technologies, Inc.



• ANALYST •

• MANAGER •

The MultiSync E Series monitors. Enhanced

Massive word processing. Seamless spreadsheet. Powerful



presentations. The look and feel of a

	CRT/VIS*	Max Res	CRT Type	Pitch
MultiSync E500™	15"/13.6"	1280 x 1024 @ 63Hz	ChromaClear®	0.25mm mesh
MultiSync E700™	17"/15.6"	1600 x 1200 @ 65Hz	ChromaClear	0.25mm mesh
MultiSync E1100™	21"/18.6"	1600 x 1200 @ 65Hz	Dot Trio	0.28mm dot (0.24mm horizontal)

The performance driven MultiSync™ E Series monitors can help. They

Each MultiSync E Series monitor is compatible with PC and Macintosh computers, includes digital ORB™ on-screen controls and features a 3 year limited warranty.

For more information or for a reseller near you, call 1-800-NEC-INFO or visit us at www.nec.com. Expect more. Experience more.



• VP •

• CHAIRMAN •

performance for every stage of your career.

provide the superior, healthy, color saturated images and ultra-high resolutions and refresh rates to handle all your critical business applications. And they do all this with

the MultiSync LCD technology. NEC MultiSync LCD monitors are the only monitors that can handle all your critical business applications. And they do all this with



sions. Both printers are easy to set up and operate, and all configuration options are available through software or the convenient front-panel controls. They both use an "instant-on" fuser design that relies on a ceramic element instead of a heated roller; this design lowers power consumption and is intended to speed first-page-out performance.

Both printers come standard with HP JetDirect 10/100Base-T Ethernet cards. The driver supports a number of audible and visible alert indicators in the event that the printer is off-line or in need of attention, including a ToolTray icon. The conditions monitored are comprehensive; about the only shortcoming is the fact that paper trays are reported only as being open, empty, or not empty—there is no report on the actual level of paper in the tray.

Each printer uses a 100-MHz NEC Vr4300 RISC processor to drive its controller. They support the PCL 6 printer language and also incorporate HP's new PostScript Level 2 Emulation feature at no extra cost (instead of the Adobe PostScript support that was an extra-cost option with earlier LaserJet models). The controller can allocate memory to various print jobs and can store the pages of a job, then print multiple collated copies without requiring the client computer to send the data again for each copy.

Tested print speeds for these printers were right in line with their rated engine speeds. At their 600-dpi default resolution, they even bested some of the 20-ppm 600-dpi printers occasionally. In terms of print quality, both printers are among the best available. Both are rated at 1,200 dpi, but they also have a FastRes 1200 mode that uses partial dot placement to provide 1,200-dpi quality output at 600-dpi performance speeds (and toner usage). The result is difficult to distinguish from typeset material, even under magnification.

The paper-handling options of these units are acceptable for their classes and prices, but note that some of the advanced options HP pioneered in its two-year-old HP LaserJet 5Si—sorting and stapling—are not offered with these models. HP is leaving those features to its new 24-ppm line, which will soon replace the LaserJet 5Si family. Duplexers are available for the 4000TN and 5000GN, and the high-capacity paper cassettes bring total input to 1,100 pages. The 5000GN comes standard with a 1GB hard disk for storing fonts and forms (though you cannot configure it to act as additional memory for the print queue); the hard disk is a \$600 option (street price) on the 4000TN.

In the end, these printers have most everything going for them: good looks, speed, outstanding print quality, and excellent network support features. They don't represent the value

of our Editors' Choice in the large-workgroup category—the 20-ppm IBM InfoPrint 20—but the HPs should be on your short list nonetheless.—*Alfred Poor*

Hewlett-Packard Co., Palo Alto, CA; 800-527-3753; www.hp.com/peripherals. Choose 523 at www.pcmag.com/infolink.

IBM InfoPrint 20



Ledger-size 20-ppm monochrome laser; 600 by 600 dpi; 650-sheet input. \$1,780 street. Tested options: Ethernet adapter, \$299 list; 8MB RAM upgrade, \$359; duplexer/sorter, \$569; 500-sheet bin, \$349; envelope feeder, \$179.

IBM made news last year when it reentered the network printer market after its five-year "no-compete" agreement with spinoff Lexmark expired. IBM Printing Systems Co.'s latest salvo is the IBM InfoPrint 20, an aggressively priced model suitable for large workgroups. Thanks to excellent output quality, respectable print speed, fine management features, and superior paper handling (including support for 13- by 19-inch paper), it's a great purchase for networked offices that need speed and large-format output. It is our

Editors' Choice in the workgroup category.

IBM's Network Printer Manager (NPM) utility makes managing the InfoPrint a breeze. The all-inclusive installation CD comes complete with network management tools and drivers for Microsoft Windows NT and Windows 95, NetWare, and Unix. A wizard guides you through the installation process for both the network management software and client drivers without hassles. IBM also includes a Web-based version so you can configure and check on printers from any browser-equipped PC if you prefer; the interface is similar

in both versions. One feature missing from NPM is the ability to upgrade a printer's firmware remotely through the management application. This upgrade procedure is available but sold separately; IBM claims it will be

added to the Windows version of NPM by midsummer.

Like the software installation, the physical setup for the InfoPrint was fairly easy. Our test configuration included an Ethernet adapter as well as a combination duplexer and sorter, which mounts on the back of the printer's chassis. The InfoPrint is almost identical to the Apple LaserWriter 8500 reviewed here, though the IBM model provides an additional comprehensive control panel on the printer from which you can configure all printer options.

Robust paper-handling options let you configure the InfoPrint as a high-capacity workhorse. In addition to the duplexer/sorter and the oversize output tray (courtesy of the Fuji/Xerox engine), there's a 2,000-sheet paper hopper (\$1,187 list); with all the paper tray options, the InfoPrint is capable of handling up to 3,150 pages. The printer comes standard with Adobe PostScript Level 3 for advanced graphics handling, as well as PCL 5e.



UMAX

Strong Today. And Tomorrow.

You want to buy a UMAX SuperMac — the lone Apple-licensed Mac clone. And therein lies your quandary.

You know SuperMacs are tops in features, performance and price. And they're 100% Mac-OS compatible. In fact, as an Apple licensed design, our S900's are just as compatible with Mac software as Apple's Power Macintosh 9500's.

But then you wonder:

Is UMAX going to be around to support my purchase for the long term?

Well, here are some hard facts about UMAX that will put your mind at ease:

UMAX IS BIG — \$700 MILLION IN SALES.

A publicly traded Taiwanese corporation around for over ten years, UMAX has worldwide annual revenues of over \$700 million. We make SuperMacs, Intel-based workstations, servers, mother-

boards, DRAMs, digital cameras, notebooks and of course, scanners (where UMAX is #1 in the U.S.).

UMAX is here to stay — today and tomorrow.

2-YEAR WARRANTY AND TECH SUPPORT.

UMAX has doubled the length of the basic S900 warranty:

Two years for all S900's purchased after March 1, 1998 — including tech support!

Nobody else even comes close to this level of service and support (ranked number one by MacWorld magazine).

It's our promise to you, backed by UMAX's size, profitability and diverse manufacturing capabilities.

UMAX IS COMMITTED TO THE POWERMAC PLATFORM.

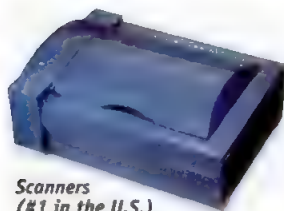
We don't just make great SuperMacs. We're continuing

to make leading edge ones. Proof? The SuperMac S900BASE w/G3 — the most powerful and expandable Mac-OS compatible computer ever (and now for under \$3000!).

It won MacWorld's Eddy Award and Editor's Choice Award for Best Professional System. Digital content creators will love the 6 PCI slots, 8 DIMM slots (for up to 1 GB of RAM), 7 total drive bays and a 250 MHz PowerPC 750 (G3) processor with a full 1 MB of backside cache!

And no matter what, we'll be selling our award-winning SuperMacs at least through the end of 1998, and perhaps way beyond.

Buy UMAX SuperMacs today — with confidence. We're here to stay.



Scanners
(#1 in the U.S.)



Digital Cameras



Award-winning
Mac-OS Compatibles



Intel-based
notebooks and
workstations

UMAX®
www.umax.com 888-235-UMAX

On our speed tests, the InfoPrint was a solid performer, second generally only to the QMS 2060 EX among 20-ppm units. Print quality is excellent for text documents and about average for graphics, where the 600-dpi output can't keep pace with the 1,200-dpi output offered by other machines. One nice touch is IBM's Toner Miser feature, which lets you reduce the amount of toner used on a print job, lengthening the life of a toner cartridge by up to 50 percent. Toner Miser is best used only on text documents, as it degrades print quality slightly.

Overall, the InfoPrint delivered good print quality with performance slightly above that of the middle of the pack. Combined with super paper-handling features and a comprehensive management application, there's no question that this printer is a serious contender—especially for the price.—*Padraic Boyle*
IBM Printing Systems Co., Boulder, CO; 800-358-6661; www.printers.ibm.com. Choose 524 at www.pcmag.com.infolink.

Lexmark Optra S1255n, S1625n, S1855n, S2455n



S1255n: Legal-size 12-ppm monochrome laser; 1,200 by 1,200 dpi; 350-sheet input. \$950 street. Tested options: 4MB RAM upgrade, \$94 list.

S1625n: Legal-size 16-ppm monochrome laser; 1,200 by 1,200 dpi; 350-sheet input. \$1,000 street. Tested options: As above, plus duplex, \$399 list; sorter, \$449; 2,000-sheet bin, \$1,179; envelope feeder, \$349.

S1855n: Legal-size 18-ppm monochrome laser; 1,200 by 1,200 dpi; 350-sheet input. \$1,130 street. Tested options: As above.

S2455n: Legal-size 24-ppm monochrome laser; 1,200 by 1,200 dpi; 1,250-sheet input. \$2,000 street. Tested options: Duplexer, \$399 list; 500-sheet bin, \$349; envelope feeder, \$349.

Versatility, easy operation, and low cost per page are the key selling points for Lexmark's four new Optra S models. While their rated speeds range from 12 to 24 pages per minute, all deliver the same excellent 1,200- by 1,200-dpi output and first-rate management software. None offers the convenience of ledger-size printing, but they're worth considering for any office that wants simplicity in setup, maintenance, and management across a variety of print speeds.

The S1255n has the muscle for only small workgroups, but it's well suited for these less demanding loads. The S1625n is a good compromise for midsize workgroup needs, while the paper loads and duty cycles of the S1855n and S2455n make them contenders for large workgroups and departmental roles. We award our Editors' Choice to the S1855n because it offers the best balance between output quality, print speed, paper handling, and network manageability.

Physically setting up the Optra S machines was a snap. Forget the hunt for brightly colored shipping tabs or fussing with the toner and fuser. Don't worry about overlooking a styrofoam insert. Just pull the printer out of the box, pull the toner out of the printer and remove its two clips, and slide the toner back in.

Add paper, plug in the power and network cables, and you're ready to set up the software.

Installing Optra S printers onto a network should present no real challenge if you're familiar with the operating systems involved. All four models use the same procedures, and you can set up multiple printers at the same time. The software walks you through the process. There are buttons for setting up the network, adding drivers, and other basic tasks, though some of the dialog boxes are a bit ambiguous. (For example, the directions for adding a TCP/IP port in Microsoft Windows are not intuitive.) In our Labs we had both Windows NT and NetWare print services running with a minimum of fuss.

Lexmark's MarkVision software provides solid management tools. Versions are available for Windows 95, Windows NT, Windows 3.x, OS/2, NetWare, and Unix. You can perform routine setup and monitoring tasks remotely, and the primary window shows all installed Lexmark printers on the network, including the unit's interface, status, and address. Double-clicking on a device opens a detailed management screen with a series of tabbed windows. The Status panel shows a photographic image of the printer; add an option and the picture is updated. A color-coded frame around the image shows the current condition; green is for okay, yellow for warnings such as a low paper tray, and red is for off-line issues that need attention. The Status panel also shows the printer's current LED readout and its installed options. You can arrange for alerts to be sent to a remote PC, even in the form of audio notices.

Another window in MarkVision shows a virtual representation of your printer's own status panel. You can use it to track statistics; note and adjust paper settings and handling options; set alarms; adjust buffering; and fine-tune emulation, resolution, and image enhancement settings. The job management window lets you view and manage the queue, including removing jobs. You can also use it to flash the firmware on multiple printers, set reminders for regular maintenance, and track statistics on usage, total and interval page counts, average time per job, and duplex usage.

Lexmark included an early edition of its Web-based version of MarkVision with the unit we saw, but this is a work in progress and offers limited functionality. During testing, we could change printer settings, but we couldn't see how the printer was currently configured with the browser-based tool. The company is working on new firmware that will provide real-time status updates over the Web. When the

firmware is released, Lexmark claims it won't be difficult to load onto your Optra S.

Adding options to any of the Optras is as simple as the initial installation. The duplex and



Lexmark's excellent Optra S series offers class-leading ease of use and fast print speeds. The 24-ppm S2455n boasts enormous paper capacity for large workgroups, but it can't beat the value of the S1855n, our Editors' Choice.

UMAX[®]

expands

the Mac market again...



(in fact, our S900 has 3 more PCI expansion slots than Apple's G3)

The completely expandable SuperMac S900BASE w/G3.



Voted MacWorld's "Best Professional System."

SuperMac S900BASE w/G3

16MB Cache
1GB RAM
100MB Hard Drive
100MB Cache



Apple G3 Tower

16MB Cache
1GB RAM
100MB Hard Drive
100MB Cache

Now with
2 year Warranty
& Free Tech
Support

FOR MORE INFORMATION ON WHERE TO PURCHASE
THE S900BASE w/G3, CALL 1-888-235-UMAX
OR VISIT US AT www.umax.com

Photoshop Productivity

Time in seconds (shorter is better)



Both computers were loaded with their maximum RAM. Score is time in seconds to complete three Photoshop 4.0 tasks with a 188MB RGB image. Measured tasks were 0.5 gaussian blur mode change to CMYK and resize image to 50%. See web for details.

Choose 241 at www.pcmag.com/infolink

S900BASE w/G3 has 64MB RAM, AGP 7200rpm SCSI HD, 24x CD-ROM and ships with our unique G3 card. This G3 card is a UMAX edition MAXpower Pro+ 750MHz PowerPC 750 processor card with a full 1MB backside cache running at 166MHz. Estimated street price: \$2995. Monitor not included. Price and features subject to change without notice. See web for details. © 1998 All rights reserved. SuperMac is a registered trademark licensed to UMAX Computer Corporation. Mac and the Mac OS logo are trademarks of Apple Computer, Inc. used under license. PowerPC and the PowerPC logo are registered trademarks of International Business Machines Corporation.

500-sheet and 2,000-sheet paper bins stack beneath the printer. There are no cables, secondary power sources, or complicated fittings to worry about. The envelope feeder slides in the front of the printer under the toner door, and the sorter bin slips into two slots on the unit's top. There is no stapler option.

The MarkNet S network interface card, designed for all the Optra S-series printers, works with both 10Base-T and 100BaseTX Ethernet networks. Token-Ring is a \$599 option (list price). You can add as many NICs as you like; the only limitation is the number of free PCI slots in the printer. All four units can automatically accept and print incoming faxes by attaching a fax modem to the serial port. The port comes standard on the S1625n and S1855n, but it's a \$99 option with the S1255n and S2455n. Once the modem is hooked up, you have to enable the Receive function through the control panel. The printer will then switch to fax mode whenever the modem sends a ring notice to it.

Despite the similarity in design among the four printers, the models are uniquely tuned to the demands of their rated speeds, with different power supplies, transport motors, and processors. During our tests, we found the Optra S printers to be able performers in their default 600-dpi modes. The S1855n, in particular, ran faster than the 20-ppm units on some of our tests. All four generally ran ahead of the competition and were very close to their rated speeds on our 50-page test document. The printers also had no problems switching between various protocols and language emulations.

There was one difficulty with our 12-page PCL test file: It opened as a 13-page document on all four Lexmark units because of the way the driver interpreted one of the fonts. The original collection of mixed text and graphics was created in Microsoft Word for Windows 95, but we opened it in Word 97. Lexmark representatives noted that they had worked to make the driver as backward-compatible as possible, which may have caused the problem. As a result, the throughput times for this test are about 8 percent longer, because of the extra page.

Output quality was very good with all four models. Text printed with solid matte-finish blacks and crisp letters. There were no noticeable jaggies, even with smaller italic fonts. Set at full 1,200- by 1,200-dpi resolution, each Optra S produced clean halftones and smooth gradient fills. Pie charts in an Excel graphic printed with solid fills, good gray scales, and no jagged edges.

It was all but impossible to produce a paper jam on the printers—even with badly crumpled pages. The error status was immediately reported in MarkVision, including the location of the jam. Once we cleared the paper path, the missing page was resent automatically, without user intervention.

Though they are limited to legal-size paper, these are excellent machines with well-designed features and software. Thanks to

simple setup, easy operation, and a low cost of ownership, the Lexmark Optra S series is a fine pick for any environment where administrative support is at a premium.—James Karney

Lexmark International Inc., Lexington, KY; 800-539-6275; www.lexmark.com. Choose 525 at www.pcmag.com/infolink.

Minolta PageWorks 12, PageWorks 20

PageWorks 12: Legal-size 12-ppm monochrome laser; 600 by 600 dpi; 750-sheet input. \$900 street. Tested options: Ethernet adapter, \$499 list; 32MB RAM upgrade, \$120 street; 500-sheet paper tray, \$259 list; PostScript Level 2, \$389 list. PageWorks 20: Ledger-size 20-ppm monochrome laser; 600 by 600 dpi; 650-sheet input. \$1,300 street. Tested options: As above.

The aggressively priced entries from Minolta Corp. each deliver superb print quality. The Minolta PageWorks 12 is intended for small workgroups, whereas the PageWorks 20 is aimed at larger workgroups that need full-bleed 11- by 17-inch output. We weren't particularly impressed with the limited features of the management application, however, and both printers were fairly slow performers compared with the competition.

Although there's no installation wizard as with the HP and Xerox products, both Minolta units offered trouble-free setup on our test network. Minolta's Network Management is a Windows-based application that configures and manages the printer remotely using IPX and TCP/IP protocols. Intuitive in design and easy to navigate, the software is nevertheless

fairly basic. It has what you need to get the printer up and running, but unlike the robust utilities from competitors such as HP and Lexmark, that's about it. For example, Minolta's Current Status feature provides little information other than two alerts, "online" and "warning"; it doesn't specify whether the printer is out of paper or a tray has been removed.

Surprisingly, the client printer driver supplies more information than the Network Management utility. A graphical view of the printer and its control panel shows the unit's current status and lets you print thumbnails and watermarks, though you cannot graphically select trays to print from or check on paper status.

Paper-handling options with the PageWorks line are not as varied as with some competitors. There are high-capacity input trays available (holding 500 sheets for the PageWorks 12, 750 for the PageWorks 20) and a \$399 duplexer for the PageWorks 20, but no sorter, stapler, mailbox, or hard disk. Notably, the PageWorks 20 does offer full-bleed 11- by 17-inch printing on 13- by 19-inch media.

Both PageWorks printers delivered excellent quality on our tests, thanks to Minolta's Super Fine MT resolution enhancement for text and Fine-ART algorithm for graphics. Performance was more disappointing. The PageWorks 12 did fine with single-job text and spreadsheet tasks but fell far behind the Lex-



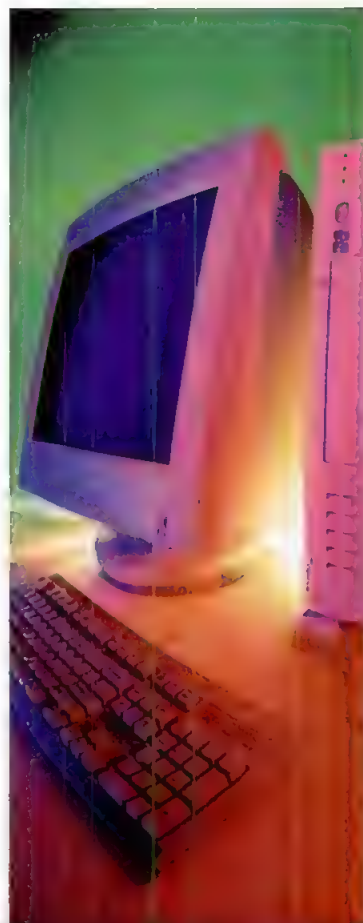
The Minolta PageWorks 20 boasts excellent output quality and generates attractive full-bleed ledger-size prints, but its spare management software and its sluggish performance left us wanting more.

Workstations so powerful they cut a monitor's price in half.

Do you shamelessly demand ever greater horsepower? More memory? More disk capacity, enhanced graphics, even greater throughput? Then affix your steely gaze upon the specs below, and see how efficiently our workstations can further your drive for power. Especially when you can get a 19" (18" viewable) or 21" (19.8" viewable) Compaq monitor for 50% off when you buy, respectively, a select 2D or 3D workstation. All by merely picking up the phone. This offer ends soon, so take charge. Our operators are ready for your call.

For the world's best-selling computers, call 1-800-315-7776, or visit your local reseller. www.compaq.com/promos/

(Compaq operators are available 8 A.M. - 8 P.M. EST, Mon. - Fri.)



Professional Workstation 5100 Starting at \$3,378*

Workstation power in an affordable desktop design.

50% off 19" (18" viewable area) V90 monitor (save \$440).*

- 333MHz Pentium® II processor w/512KB cache (supports up to 2 processors)
- 64MB EDO DIMM memory (expandable to 512MB)
- 4GB Wide-Ultra SCSI SMART hard drive

- ELSA GLoria Synergy (Permedia-2) graphics controller for optimized performance of 2D graphics applications
- 5 slots/5 bays
- Netelligent 10/100 TX autosensing Ethernet
- Microsoft Windows NT® Workstation 4.0
- Highly Parallel System Architecture (HPSA)

Professional Workstation 6000 Starting at \$6,618*

The industry-standard workstation designed with the right combination of performance and expandability to adapt to your increasingly demanding applications.

50% off 21" (19.8" viewable area) P110 monitor (save \$800).*

- 300MHz Pentium II processors with 512KB cache (supports up to 2 processors)
- 128MB EDO DIMM memory, expandable to 512MB

- Diamond Fire GL 4000 graphics controller for your most demanding 3D true-color applications
- 4GB Wide-Ultra SCSI SMART hard drive
- 6 slots/10 bays
- Netelligent 10/100 TX autosensing Ethernet
- Microsoft Windows NT Workstation 4.0
- Highly Parallel System Architecture (HPSA)

4.9% Financing available from Compaq Capital on Compaq hardware.



© 1998 Compaq Computer Corporation. All rights reserved. Compaq registered U.S. Patent and Trademark Office. *All prices and discounts shown refer to U.S. estimated selling prices on select models. Reseller prices may vary. Offer with purchase of qualifying product thru 6/30/98 while supplies last. Offers not valid on Compaq refurbished products. Valid only in the U.S. Compaq reserves the right to change, alter, or cancel these programs at any time without notice. The Intel Inside Logo and Pentium are registered trademarks of Intel Corporation. Microsoft and Windows NT are registered trademarks of Microsoft Corporation. Other products mentioned herein may be trademarks or registered trademarks of their respective companies. **Offer subject to change and restrictions apply. Financing offered by Compaq Capital Corporation to qualified commercial customers in the U.S. who acquire at least five units or \$15,000 worth of Compaq equipment (lender equipment is not eligible for this offering). Offer is based on dealer sales price and few lease rates are also available. Offer may not be combined with special discounts and is subject to credit approval and execution of standard lease documentation. Offer is subject to other restrictions and Compaq Capital reserves the right to change, alter or cancel this offering at any time without notice. Lease must commence on or before June 30, 1998.

COMPAQ

mark and NEC 12-ppm models when we sent multiple jobs simultaneously or asked for multiple copies of a single print job: Throughput dropped to around 5 ppm on these tasks. The PageWorks 20 had a similar Achilles' heel: Its effective throughput for multiple jobs fell to as low as 8 ppm.

These are competent printers, but competing models offer more robust administration and better speed.—*PB*

Minolta Corp., Peripheral Products Division, Mahwah, NJ; 800-459-3250; www.minoltaprinters.com. Choose 526 at www.pcmag.com/infolink.

NEC SuperScript 1260

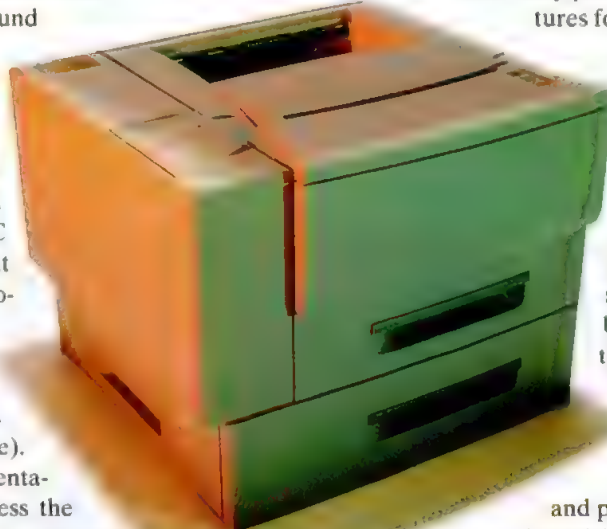
Legal-size 12-ppm monochrome laser; 600 by 600 dpi; 250-sheet input. \$700 street. Tested options: Ethernet adapter, \$300 street.

NEC's SuperScript 1260, the least expensive printer in this roundup, is aimed squarely at small offices that need moderate speed for a handful of users at a good price. It offers functional though hardly fancy networking and administration support and only basic paper-handling capabilities. But the printer is worth a look for businesses watching the bottom line.

The SuperScript is built around Adobe's PrintGear technology, a combination of a proprietary printer language and a custom 60-MHz ASIC that speeds page rendering while keeping the cost of the controller low compared with PCL or PostScript controllers. NEC delivers a Web-based management tool, the Management Access Program, which reports on basic printer status (paper jam, paper out, toner out) but not more advanced message alerts (paper or toner low, for example). Nor does it offer a graphical representation of the printer. You can access the printer, however, by simply typing in the IP address. You can view only one printer at a time through the page, but you can test the printer and even access NEC's Web site for help with setting it up.

For Microsoft Windows and Macintosh users, the SuperScript's driver contains a number of nifty features including booklet and thumbnail, custom watermarks, and the ability to turn a single page into a multipage poster. Unfortunately, the end-user driver lacks feedback from the printer, such as paper and toner levels or downed printers.

Overall, the NEC's print quality was acceptable. Text was suitably crisp for a 600-dpi laser, though we found the contrast on graphics a little harsh. In performance testing, the NEC was generally quick for a 12-ppm printer on most tests, including our demanding Multiple Simultaneous Jobs and Multiple Copies tests. It slowed down considerably on our 2-Page Spreadsheet test, however.



Although it lacks robust management features for large office networks, the value-priced NEC SuperScript 1260 offers a good balance of speed and print quality for small offices that need to watch their budgets.

While managers of large networks will shy away from the SuperScript 1260's somewhat proprietary management scheme, the printer is just the thing for a small-office manager who needs a simple solution to get a group up on a network.—*PN*

NEC Technologies Inc., San Jose, CA; 800-632-4636; www.nec.com. Choose 527 at www.pcmag.com/infolink.

Okidata OkiPage 20DXn

Legal-size 20-ppm monochrome laser; 1,200 by 600 dpi; 630-sheet input. \$2,399 list. Tested options: Ethernet adapter, \$395.

The Okidata OkiPage 20DXn is a high-capacity printer with good paper-handling capabilities, offering high-quality output for medium-size and large workgroups. A lackluster management solution and below-average print speeds, however, keep the OkiPage from being the toughest kid on the block.

Setting up and configuring the OkiPage was fairly simple using OkiView, the company's proprietary Windows-based printer management application. In contrast to solutions from HP and others, there is no Web-based version of OkiView.

The utility provides many of the rudimentary features found in most printer managers, such as network adapter configuration and printer status. Its capabilities and user interface, however, are basic at best. The status view appears only if a printer is off-line or idle, with no other determining values available. In the event of an empty tray, for example, the status simply changes from idle to off-line. Unlike other printers in this roundup, the OkiPage's network adapter took almost 10 minutes to connect to our test server after each consecutive reboot. Okidata recognizes this network attachment problem and plans to address it in future releases.

One of the OkiPage's strong points is its set of paper-handling features, both standard and optional.

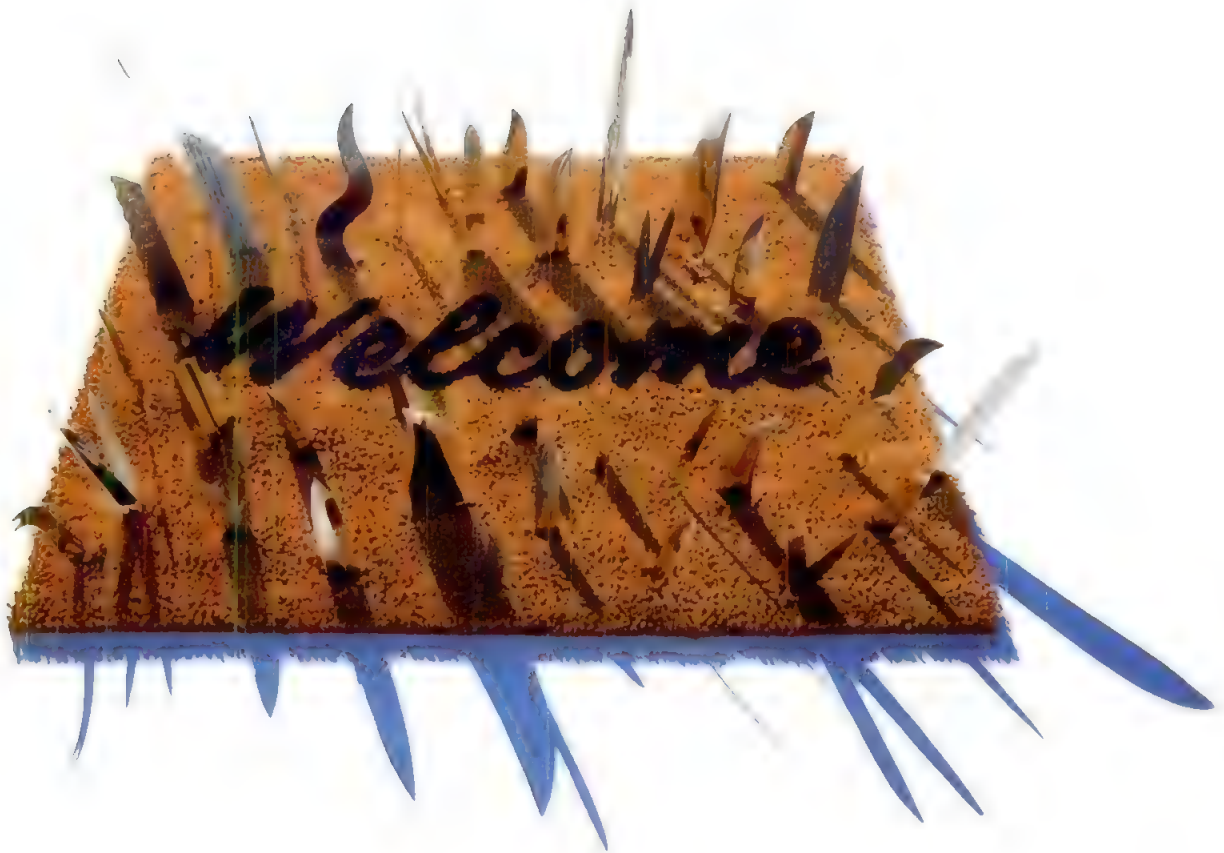
The printer comes standard with a duplexer and two 630-sheet input bins. Optionally, one additional 530-sheet bin can be added to bring the output to 1,790 sheets. The addition of multi-feed and manual-feed trays containing 100 sheets each brings the total up to 1,990 sheets, although 1,790 sheets will be the configuration most often used in a shared environment.

Along with other printers in its class, the OkiPage had very good output quality. On our performance tests, the printer performed on a par with other 20-ppm units on straight-text documents, but throughput fell to just 6.7 ppm with a mixed text and graphics file. The OkiPage also fared poorly when we sent it several print jobs simultaneously and when we asked it for multiple copies of a single job.

Although paper-handling options and output quality are two of its more appealing qualities, the OkiPage 20DXn is a bit rough around the edges.—*PB*

Okidata, Mt. Laurel, NJ; 800-654-3282, 609-235-2600; www.okidata.com. Choose 528 at www.pcmag.com/infolink.

We greet every visitor
to your network with the same
warmth and hospitality.



NOW THAT MCAFEE ASSOCIATES AND NETWORK GENERAL HAVE BECOME NETWORK ASSOCIATES,TM
80% OF THE FORTUNE 100 DEPEND ON US FOR NETWORK SECURITY AND MANAGEMENT. AND HACKERS
CAN DEPEND ON US FOR A SERIOUS LACK OF HOSPITALITY. CALL
US AT 1-800-332-9966, DEPT. 1332, OR VISIT WWW.NAI.COM.



Who's watching your network



©1998 Network Associates Inc.

Choose 299 at www.pcmag.com/infolink

QMS 2060 EX, 2425 Turbo EX

2060 EX: Ledger-size 20-ppm monochrome laser; 1,200 by 1,200 dpi; 400-sheet input. \$3,099 list. Tested options: Duplexer, \$499.

2425 Turbo EX: Ledger-size 24-ppm monochrome laser; 600 by 600 dpi; 1,100-sheet input. \$3,949 list. Tested options: Sorter/stapler, \$1,499; 2,000-sheet input bin, \$1,299; duplexer, \$599.

Speed and versatility characterize QMS's network printers. The QMS 2425 Turbo EX, an Editors' Choice recipient for the last two years, continues to be a leading workhorse printer, successfully addressing all parts of the printing process including paper handling, network efficiency, print speed, and document finishing. The faster Xerox DocuPrint N32 has supplanted the 2425 as our departmental Editors' Choice, but the QMS is still a fine machine. The QMS 2060 EX provides the same excellent administration tools and speed as the 2425, though without the 2425's advanced paper-handling and finishing options.

QMS bundles a robust suite of network and printer management utilities, which consists of four components: CrownAdmin 3, CrownView, Crown Print Auditor (CPA), and serverless printing software. CrownAdmin lets you remotely monitor and configure one printer or a group of printers at the same time. It also makes it easy to perform enterprise-wide administrative tasks, such as upgrading the firmware on a set of printers. You can use the utility to access QMS's driver-support Web page, download an upgrade file, and then broadcast the file to your group of printers directly from the utility. One drawback is that, unlike the utilities from HP, Lexmark, and Xerox, CrownAdmin doesn't let you see or control non-QMS printers on the network.

The second component of QMS's software suite is CrownView, an HTML page that resides in the memory of each printer and displays status and configuration settings in an interactive format over TCP/IP.

You can use any Web browser to view such data as available toner levels (through a graphical gas gauge) and current and past jobs in the print queue. You can also configure the operator's control panel to adjust paper input, copy counts, and finishing options like duplex printing, stapling, and stacking. CrownView is also a good interface for upgrading your printer's firmware. Just click on QMS's driver support page on the Web, download a file, and send it directly to your printer as a print job. QMS's third utility, called Crown Print Auditor (CPA), is used to capture and track usage patterns. This application supplies accounting information such as toner usage, pages printed, and other valuable statistics. CPA is a godsend if you need to bill departments or clients, balance printing loads over a certain period of

time, or update your consumables inventory.

QMS's multitasking Crown architecture ensures efficient simultaneous processing of all parts of the printing process. Print jobs spool automatically to the printers' hard disks (540MB is standard) before being processed and rasterized. In this way, the pipeline

is always ready for the next incoming job. This architecture is most effective when printing multiple documents.

On our tests, the 2060 beat all other 20-ppm printers when printing multiple simultaneous jobs or producing multiple copies of the same job. The 2425 was also an above-average performer. The print quality from both of these machines is beyond reproach. We were especially impressed with the 2060, whose excellent graphic output makes it a good choice for desktop publishing chores.

The 2425 has the edge in paper handling, with an available sorter/stapler combination that can staple in whatever corner you choose and a 2,000-sheet input tray that's not available for the 2060. With a fully configured 2425, users can print, collate, and finish multiple originals and never go near the office copier.

The QMS 2425 Turbo EX is a great choice for departmental document printing, and the 2060 EX is a viable option for speedy, high-quality monochrome graphics output. The company's Crown technology is a powerful solution that can easily meet the needs of the most demanding multiplatform network environments.

—Denis Tom

QMS Inc., Mobile, AL; 800-523-2696; www.qms.com. Choose 530 at www.pcmag.com/infolink.



The speedy QMS 2425 Turbo EX (top) and QMS 2060 are efficient, robust laser printers with excellent network management packages. Both are excellent workhorses, but they're edged out by the competitively priced Xerox DocuPrint N32 and IBM InfoPrint 20.

Xerox Document Centre 230LP

Ledger-size 30-ppm monochrome laser; 600 by 600 dpi; 4,050-sheet input. \$8,995 list. Tested options: Mailbox, \$1,200 street; envelope tray, \$250.

One look and you'll know the Xerox Document Centre 230LP is a machine with potential—not only because of what it can do for you, but also because of what you can do to it. Unlike the DocuPrint models we also reviewed, which come from Xerox's Channels Group (the computer products arm), the Document Centre is the brainchild of the Office Document Products Group—the folks who make the copiers. So although you can buy just the base network printer module (reviewed here), Xerox also sells add-on modules that transform the unit into a multifunction device complete with copying, scanning, and fax capabilities (for details, see the sidebar "Copier Companies Fight Back").

As for the printer itself, it boasts exemplary Web-based control, top-notch print quality, snappy paper handling capable of



The new, faster Lexmark Optra S Printers: Better than HP without sticking your neck out.



April 10, 1997
Lexmark Optra S 1250
Lexmark Optra S 1500

Lexmark just built a whole new Animal. Four new 1996 Optra™ S series printers with performance and features that'll make you rethink the printer kingdom.

HP compatible. Absolutely. Every Optra S includes PostScript Level 2 and PCL 6 emulations at no extra charge. Right out of the box it's up and running. Because all major network environments are completely supported.

Faster processors than HP. The new Optra S series really flies. Up to a blazing 24 ppm. Prints in 30ths every 100" in its class. With up to 133MHz. First page in as little as 10 seconds. More RAM than ever. And crisp, clear true 1200 dpi.

More adaptable than HP. The new Optra S series shares the same supplies and input/output. So you can mix and match paper trays and toner cartridges. No need to juggle supplies.

More value than HP. Side by side, Lexmark for Lexmark, the Optra S series delivers more for the money. And prices lower your spending too. Find out why we're head and shoulders above HP. Call 1-800-LEXMARK (1-800-539-6275) or visit us at www.lexmark.com.

A whole new breed of performance printers.

LEXMARK

SUMMARY OF FEATURES

Monochrome Network Printers



	Apple LaserWriter 8500	HP LaserJet 4000TN	HP LaserJet 5000GN	IBM InfoPrint 20	Lexmark Optra S1255a	Lexmark Optra S1625a	Lexmark Optra S1855a
■ YES ■ NO							
Price of basic configuration	\$1,999 list	\$1,600 street	\$2,600 street	\$1,780 street	\$950 street	\$1,000 street	\$1,130 street
Price of tested configuration	\$2,776 list	\$1,600 street	\$2,600 street	\$2,700 street	\$1,330 street	\$1,400 street	\$1,485 street
Rated engine speed/engine manufacturer	20 ppm/Fuji-Xerox	17 ppm/Canon	16 ppm/Canon	20 ppm/Fuji-Xerox	12 ppm/Lexmark	16 ppm/Lexmark	18 ppm/Lexmark
Base/maximum RAM	16MB / 48MB	6MB / 100MB	12MB / 100MB	8MB / 96MB	4MB / 68MB	4MB / 68MB	8MB / 132MB
Tested RAM	16MB	6MB	12MB	16MB	8MB	8MB	12MB
Standard/maximum resolution (dpi)	600 x 600 / 600 x 600	1,200 x 600 / 1,200 x 1,200	1,200 x 600 / 1,200 x 1,200	600 x 600 / 1,200 emulation	1,200 x 1,200 / 1,200 x 1,200	1,200 x 1,200 / 1,200 x 1,200	1,200 x 1,200 / 1,200 x 1,200
RAM needed for maximum resolution	16MB	6MB	12MB	12MB	4MB	4MB	4MB
Processor model/speed	AMD29040 / 60 MHz	NEC Vr 4300 / 100 MHz	NEC Vr 4300 / 100 MHz	Intel i960HD / 50 MHz	NEC 4305-80 / 67 MHz	NEC 4300 / 100 MHz	NEC 4300 / 133 MHz
Highest PCL supported	N/A	PCL 6	PCL 6	PCL 5e	PCL 6	PCL 6	PCL 6
Highest Postscript supported/list price	Level 3 / included	Level 2 / included	Level 2 / included	Level 3 / included	Level 2 / included	Level 2 / included	Level 2 / included
Drivers and Software							
Drivers available:							
Microsoft Windows 95/3.x/NT	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
OS/2 Warp / Mac OS / Unix	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Printer-management utility:							
Runs under NetWare / Windows NT / OS/2 Warp	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Runs under Mac OS/Unix	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Web-based version for remote management	■	■	■	■	■	■	■
Can see/control other printer brands	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Remote messages supported:							
Paper jam/Paper low/Paper out	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Toner low/Toner out/Usage tracking	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Graphical paper status/tray selection	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Paper Handling							
Rated duty cycle (pages per month)	50,000	65,000	65,000	75,000	35,000	65,000	65,000
Number of standard paper inputs/total capacity	2 / 650 sheets	3 / 600 sheets	3 / 850 sheets	2 / 650 sheets	2 / 350 sheets	2 / 350 sheets	2 / 350 sheets
Total capacity of standard output tray	350 sheets	300 sheets	300 sheets	500 sheets	250 sheets	250 sheets	250 sheets
Prints on legal-size/ledger-size (11" x 17") paper	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Heaviest paper stock accepted	32 lb.	53 lb.	53 lb.	30 lb.	110 lb.	110 lb.	110 lb.
Options:							
High-capacity paper cassette	500-sheet, \$279	500-sheet, \$250	500-sheet, \$279	2,000-sheet, \$1,187	500-sheet, \$349; 2,000-sheet, \$1,179	500-sheet, \$349; 2,000-sheet, \$1,179	500-sheet, \$349; 2,000-sheet, \$1,179
Envelope feeder (capacity/price)	75 / \$149	75 / \$365	None	75 / \$179	85 / \$349	85 / \$349	85 / \$349
Duplexer	\$349	\$260	\$399	With sorter	\$399	\$399	\$399
Sorter	None	None	None	\$569	\$449	\$449	\$449
Lockable mailbox	None	None	None	None	None	None	None
Stapler	None	None	None	None	None	None	None
Hard disk (capacity/price)	Info not available	1GB / \$599	1GB / included	1.4GB / \$559	840MB / \$499	840MB / \$499	840MB / \$499
Estimated cost per page (typical text page, 5% coverage)	1.6 cents	1.2 cents	1.4 cents	1.3 cents	1 cent	1 cent	1 cent
Interfaces and Networking							
Ethernet adapter (IPX/SPX and TCP/IP)	Included	Included	Included	\$299 list	Included	Included	Included
Card supports EtherTalk/NetBEUI/NetBIOS	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Token-Ring adapter	None	\$529 list	\$529 list	None	\$599 list	\$599 list	\$599 list
Supports more than one installed network adapter	■	■	■	■	■	■	■
LocalTalk/SCSI/Serial port	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Supports simultaneously active ports	■	■	■	■	■	■	■
Supports Direct Print for serverless printing	■	■	■	■	■	■	■
Service and Support							
Warranty	1 year	1 year	1 year	1 year	1 year	1 year	1 year
Technical-support hours (eastern time)	9:00-9:00 M-F	10:00-10:00 M-F	10:00-10:00 M-F	24 hours, 7 days	9:00-9:00 M-F; Noon-6:00 Sat., Sun.	9:00-9:00 M-F; Noon-6:00 Sat., Sun.	9:00-9:00 M-F; Noon-6:00 Sat., Sun.
Web address	www.apple.com	www.hp.com/ peripherals	www.hp.com/ peripherals	www.printers. ibm.com	www.lexmark .com	www.lexmark .com	www.lexmark .com

N/A—Not applicable: The product does not have this feature.

Network Printers

See www.pcmag.com for interactive views



Lexmark Optra S2455n	Minolta PageWorks 12	Minolta PageWorks 20	NEC SuperScript 1260	Okidata OkiPage 20DXn	QMS 2060 EX	QMS 2425 Turbo EX	Xerox DocuPrint N24	Xerox DocuPrint N32	Xerox Document Centre 230LP
\$2,000 street	\$900 street	\$1,300 street	\$700 street	\$2,399 list	\$3,099 list	\$3,949 list	\$2,450 street	\$2,900 street	\$8,995 list
\$2,400 street	\$1,400 street	\$1,800 street	\$700 street	\$2,794 list	\$3,099 list	\$3,949 list	\$2,450 street	\$4,770 street	\$8,995 list
24 ppm/Lexmark	12 ppm/Minolta	20 ppm/Minolta	12 ppm/Fuji-Xerox	20 ppm/Okidata	20 ppm/Canon	24 ppm/Canon	24 ppm/Fuji-Xerox	32 ppm/Fuji-Xerox	30 ppm/Xerox
16MB / 136MB	4MB / 36MB	4MB / 68MB	2MB / 16MB	12MB / 68MB	48MB / 128MB	32MB / 128MB	12MB / 128MB	12MB / 128MB	32MB / 128MB
16MB	36MB	36MB	2MB	12MB	48MB	32MB	12MB	44MB	32MB
1,200 x 1,200 / 1,200 x 1,200	600 x 600 / 600 x 1,200	600 x 600 / 600 x 1,200	600 x 600 / 600 x 1,200	1,200 x 600 / 1,200 x 600	600 x 600 / 1,200 x 1,200	600 x 600 / 1,200 x 1,200	600 x 600 / 600 x 600	600 x 600 / 600 x 600	600 x 600 / 600 x 600
4MB	4MB	4MB	2MB	4MB	48MB	48MB	12MB	12MB	32MB
NEC 4300 / 133 MHz	Intel i960JF; QuickPrint / 33 MHz	Intel i960JF; QuickPrint / 33 MHz	Adobe PrintGear Imaging Processor / 60 MHz	MIPS R3000 / 40 MHz	NEC VR4300 / 133 MHz	NEC VR4300 / 133 MHz	Intel i960HD / 66 MHz	Intel i960HD / 66 MHz	Motorola PowerPC / 100 MHz
PCL 6	PCL 5e	PCL 5e	PCL 4	PCL 6	PCL 5e	PCL 5e	PCL 5e	PCL 5e	PCL 5e
Level 2 / included	Level 2 / \$389	Level 2 / \$419	N/A	Level 2 / included	Level 2 / included	Level 2 / included	Level 2 / included	Level 2 / included	Level 2 / included
100,000	35,000	35,000	20,000	50,000	50,000	100,000	100,000	100,000	150,000
3 / 1,250 sheets	2 / 750 sheets	2 / 650 sheets	2 / 830 sheets	2 / 630 sheets	2 / 400 sheets	3 / 1,100 sheets	2 / 1,050 sheets	2 / 1,050 sheets	4 / 4,050 sheets
500 sheets	500 sheets	500 sheets	250 sheets	250 sheets	500 sheets	600 sheets	700 sheets	700 sheets	1,300 sheets
110 lb.	90 lb.	90 lb.	50 lb.	36 lb.	42 lb.	34 lb.	110 lb.	110 lb.	110 lbs.
500-sheet, \$349; 2,000-sheet, \$1,179	500-sheet, \$259	750-sheet, \$149	500-sheet, \$199	530-sheet, \$299	500-sheet, \$399	2,000-sheet, \$1,299	2,500-sheet, \$1,190	2,500-sheet, \$1,190	2,000-sheet, \$1,200
85 / \$349	15 / included	15 / included	50 / \$99	50 / included	None	100 / \$599	100 / \$400	100 / \$400	70 / \$250
\$399	None	\$399	None	\$395	\$499	\$599	\$550	\$550	Included
\$449	None	None	None	None	None	\$1,499	None	None	None
None	None	None	None	None	None	None	\$1,350	\$1,350	\$1,200
None	None	None	None	None	None	With sorter	\$1,970	\$1,970	\$250
840MB / \$499	None	None	None	None	540MB / included	540MB / included	1.4GB / \$520	1.4GB / \$520	2GB / included
1 cent	2 cents	2 cents	2 cents	2 cents	2 cents	2.5 cents	1 cent	1 cent	1.3 cents
Included	\$499 list	\$499 list	\$300 street	\$395 list	Included	Included	Included	Included	Included
\$599 list	None	None	None	\$395 list	\$649 list	\$649 list	\$560 street	\$560 street	\$495 list
1 year	1 year	1 year	1 year	1 year	1 year	1 year	1 year	1 year	None
9:00-9:00 M-F; Noon-6:00 Sat., Sun.	24 hours, 7 days	24 hours, 7 days	8:00-8:00 M-F	24 hours, 7 days	9:00-7:00 M-F	9:00-7:00 M-F	9:00-6:00 M-F	9:00-6:00 M-F	24 hours, 7 days
www.lexmark.com	www.minoltaprinters.com	www.minoltaprinters.com	www.nec.com	www.okidata.com	www.qms.com	www.qms.com	xerox.networkprinters.com/products	xerox.networkprinters.com/products	www.xerox.com

servicing a full department of users, and easy maintenance, missing the mark only occasionally with a few conceptual flaws. It's pricey for a printer, especially given the great value of the DocuPrint N32, but it's definitely worth a look if you plan to expand it into a multipurpose digital office appliance.

The 2GB hard disk that comes bundled with the printer holds a virtual Web server, which gives full control over setup and operation via Xerox's CentreWare Network Services—a suite of utilities for administrators and users. Also included on the disk is a proprietary Windows-based management program that duplicates most—but not all—of the functions included in the Web version. Unlike the DocuPrint version of CentreWare, the utility can control only Xerox Document Centre printers, not all printers on the network.

The tower mailbox lets you direct print jobs to individual mailboxes assigned by the administrator. The machine does not have a collater as such; instead, it collates jobs electronically, printing each copy of a multiple print job to a single-tray "finisher" that staples up to 50 sheets, then jogs to interleave and separate each copy. A duplexer is also included. The standard 4,050-sheet input capacity (in four 500-sheet bins, plus a 50-sheet auxiliary input) rounds out the impressive paper handling—and you can even add a 2,000-sheet hopper (\$1,200).

The Document Centre's 600-dpi output is excellent; the sharp black text and graphics make your choice of paper the primary quality limitation. In performance testing, the 230LP showed good speed, generally second only to the 32-ppm Xerox DocuPrint N32.

Although upgradability is the chief reason to consider the pricey 230LP, if you choose not to upgrade you'll still have a fairly easy-to-manage network printer well able to handle the abuse of the most miscreant department or workgroup.—*Winn L. Rosch*
Xerox Corp., Office Document Products Group, Rochester, NY;
800-275-9376; www.xerox.com. Choose 532 at www.pcmag.com/infolink.

Xerox DocuPrint N24, N32



N24: Ledger-size 24-ppm monochrome laser; 600 by 600 dpi; 1,050-sheet input. \$2,450 street.

N32: Ledger-capable 32-ppm monochrome laser; 600 by 600 dpi; 1,050-sheet input. \$2,900 street. Tested options: 32MB RAM upgrade, \$720; duplexer, \$550; 10-bin mailbox collator, \$1,350.

These high-performance printers from Xerox Corp. are both designed to handle departmental workloads at a reasonable price. The two are identical, but for their engine speeds, right down to the space-saving small-footprint design. Their combination of output quality, options, and ease of installation makes them strong contenders. The Xerox DocuPrint N32 is overall the best departmental laser we tested and is an Editors' Choice.

The N24 and N32 share Xerox's CentreWare configuration and management software, which lets you create server queues,

upgrade print drivers on client systems, and update the printer's flash ROM. We had no trouble setting up the printers on our Windows NT and NetWare networks. On the management side, the printers can report a range of printer status items, including the level of paper supply in 25 percent increments. The PrinterMap utility makes it easy to manage SNMP-compliant printers from Xerox and other vendors, including HP and Lexmark. In addition to remote monitoring and management features, the software can also automate usage tracking for bill-back accounting. Finally, Xerox provides NDPS Gateway software to support Novell's Dis-

tributed Print Services. And like HP, Lexmark, and QMS, Xerox's network printers are now Web-enabled. An embedded Web server makes it possible to monitor, configure, and manage one of these printers using just your browser, either across a local network or using the Internet.

Notably, the N24 and N32 share the same modular options—a lockable mailbox, stapler, and 2,500-sheet input hopper—which makes it easy to configure the printer you need. This also means that you can move the options from one printer to another if you decide to upgrade to the faster model. The one-piece toner and drum cartridge makes initial installation easy, and most paper-handling options simply snap or drop into place.

End-user features are friendly and convenient. The printer driver provides a graphical representation of the printer and

indicates any error condition on screen. (You do need to refresh the image manually to update it, but this is a minor complaint.) The optional ten-bin mailbox is a handy feature that lets administrators assign separate bins to different users or groups, so you don't have to leaf through a pile of output to find your job. Instead of the mailbox, you can connect a three-bin sorter/stapler (\$1,970 street) that automatically collates jobs and staples in your choice of three positions. Both printers are capable of producing full-bleed output on 11- by 17-inch ledger pages.

In terms of performance, both printers produced high-quality images quickly. Thanks to its 32-ppm engine, the N32 topped the charts on most of our tests, while the N24 was competitive with other 24-ppm units across the board. The 600-dpi output resulted in sharp text and line graphics on our tests, with dark, smooth areas of black.

With identical print quality, drivers, software, and other features, the only details separating the N24 and N32 are eight pages per minute of rated print speed and \$450 in the street price. Though both are excellent choices, the N32's 33 percent increase in speed is probably worth the extra money, especially if you'll be printing many shared jobs or long print runs.—*AP*
Xerox Corp., Channels Group, Rochester, NY; 800-349-3769; xerox.networkprinters.com/products. Choose 532 at www.pcmag.com/infolink.



The lightning-fast Xerox DocuPrint N32 is the best monochrome laser we tested for heavy-duty departmental use. Its balance of speed, output quality, and paper handling earn it our Editors' Choice.



Okay, you can stop
oogling at its sleek
magnesium body.

We both know it's what's
inside that counts.

True XGA resolution

600 ANSI lumens
of brightness

Compact and
lightweight-12.8 lbs.

APA function for
auto set-up

New
Fly Eye Light
Integrators
for enhanced
uniformity



Just for a moment forget its lightweight, portable body. Instead, direct your attention to its heart and soul. The things that make the VPL-X600U remarkably clear and bright. Like true XGA resolution and 600 ANSI lumens. You can also take a look at the new VPL-S600U with true SVGA resolution and 650 ANSI lumens in the same sleek body. Then you'll see that after all, beauty isn't only skin deep. To get a closer look, go to www.sony.com/professional or call 1-800-472-7669, ext. XGA.

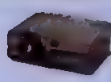
For your FREE Interactive Guide
to Effective Presentations CD-ROM,
call 1-800-472-7669, ext. XGA.



VPL-500 Lite Series



VPL-800 Series



VPL-600 Series



SONY

©1998 Sony Electronics Inc. Sony and the three year logo are trademarks of Sony. Reproduction in whole or part without written permission is prohibited. All rights reserved. See actual warranty for details on the three year warranty. Excludes pickup.

Brother HL-2400CN

Legal-size color laser; 16 ppm monochrome, 4 ppm color; 2,400 by 600 dpi; 250-sheet input. \$3,500 street. Tested options: Ethernet adapter, \$399 list; 250-sheet bin, \$399.

Brother International Corp. enters the color laser market with its Brother HL-2400CN. Attractively priced, the printer boasts high-capacity toner cartridges (10,000 pages for black, 6,000 pages for color) and a speed rating that would make it a good fit for a medium-size or large workgroup. On our tests, however, the printer failed to produce our color-intensive PowerPoint presentation in a reasonable amount of time, and its speed for both color and monochrome jobs trailed the pack—despite having the highest-rated engine speed. Also, the unit's network support proved to be less than ideal, particularly for Windows NT.

Network setup under NetWare is straightforward. You use NetWare's NWAdmin to set up the printer, then install the drivers from floppy disks onto each workstation. There was no need, with our test-beds, to configure anything at the printer itself. Setting the unit up under Windows NT, however, qualifies as user-unfriendly, if not actively user-hostile. Installing the printer under NetWare took under an hour. Installation under Windows NT took almost two full days—even with Brother's assistance on-site—because the printer requires Windows NT to emulate Unix; using the default settings does not work. You have to uncover such issues as the need to install TCP/IP Printing Services, which Windows NT doesn't install by default, and the need to edit a file manually in the Winnt\system32\drivers directory.

Once you're set up, network support is minimal. Brother's administration utility is somewhat limited, though the software lets you see a list of the printers it finds and the status for each, and you can configure each print server. The printer's built-in Web page offers more features, such as being able to see front-panel messages and configure the printer, but for only the one printer your browser is currently examining. Brother says you can receive status alerts through the printer driver, but the feature did not work on our tests. According to Brother, that was because NetWare did not have the notify feature set to on.

Setting up the printer itself is reasonably easy: You simply slide in the four toner cartridges, the OPC belt cartridge, and the fuser oil bottle. At first glance, the output quality for graphics and photos is gorgeous, with fully saturated color and smoother gradients than most color laser printers offer. But the easily visible dithering, which shows up as thin vertical stripes, ruins the effect if you look at the image for more than a few seconds. Text and thin lines had crisp edges.

The printer couldn't print our 8- by 10-inch image at its highest

resolution of 2,400 by 600 dpi, though it had no trouble at 600 by 600 dpi. (At this writing, Brother is investigating the problem.) On our 6-Page Presentation test, using Microsoft PowerPoint, the Brother was still working on the job after 45 minutes, at which point we pulled the plug. Other color scores were average or below, though the printer did well on our black-and-white 12-Page Text test and our 12-Page Text and Graphics test.

Though the low price may be attractive, the Brother HL-2400CN is not quite ready for prime time. The company needs to beef up Windows NT support and work to unleash the speed lurking in the engine.—*M. David Stone*

Brother International Corp., Somerset, NJ; 800-276-7746, 908-704-1700; www.brother.com. Choose 521 at www.pcmag.com/infolink.

HP Color LaserJet 5M

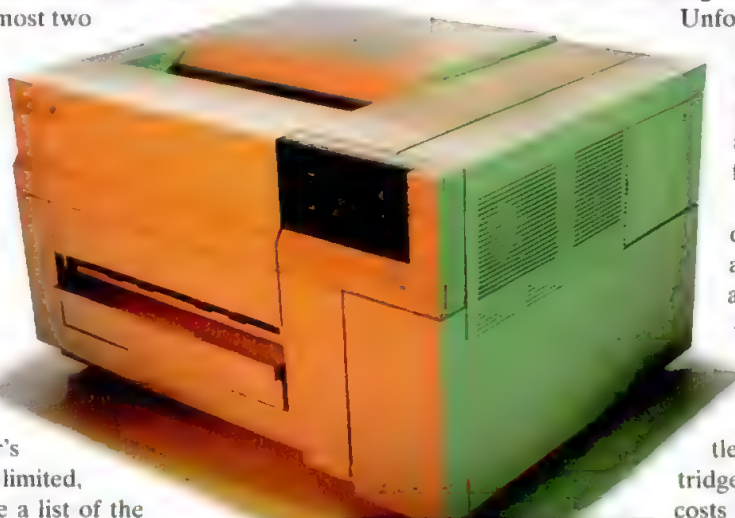
Legal-size color laser; 10 ppm monochrome, 3 ppm color; 300 by 300 dpi; 250-sheet input. \$5,200 street (without PostScript, \$4,000).

The big news about the new HP Color LaserJet 5M is that the output is much better than what we saw last year. Photo output still trails the class-leading Tektronix Phaser 560, but the HP is still a good choice for typical business graphics. HP's administration and networking are the best of the bunch.

Unfortunately, this printer's toner capacity and rated speed are adequate only for a small workgroup or as a supplemental printer for a larger group.

The Color LaserJet offers the same impeccable approach to network setup and support as HP's monochrome lasers. Physical setup is a bit unusual, because the printer uses loose toner in bottles instead of slide-in cartridges. This keeps per page costs down—indeed, they are the lowest in this group—but toner replacement can be messy and bothersome. Each bottle is good for only about 3,000 pages, so you'll be replacing toner relatively frequently.

Color graphics output was in the first tier or close behind. Edges in text and graphics were crisp, and colors were fully saturated, with gradients showing only relatively subtle banding. We noticed markedly worse output from this same model last year; HP theorizes that the previous unit needed a service call for color balancing. Dithering is still visible but now looks like texturing in matte photographic prints—less annoying than it might have been. Output also has a flat look, not shiny like most color laser output. If you prefer this, you may be inclined to forgive the dithering. But be aware that photos will be slightly posterized, with some loss of subtle variations.



The HP Color LaserJet 5M delivers good graphics output and passable photos. Network utility is first-rate, but the printer is slower than others, and refilling the toner is a chore. In general, it's a good choice for small offices.

FOR \$5.65/DAY, OUR SERVER TAKES YOUR BUSINESS PLACES IT'S NEVER BEEN BEFORE.

DELL® POWEREDGE® 2200 SERVER
233MHz PENTIUM® II PROCESSOR
(Dual Processor Capable)

- ★ **64MB ECC EDO Memory**
- 512KB Integrated L2 ECC Cache
- Integrated PCI Ultra-Wide SCSI-3 Controller
- 4GB Ultra-Wide SCSI-3 Hard Drive (7200 rpm)
- 24X Max® Variable SCSI CD-ROM Drive
- 3Com® 3C905 10/100 PCI Ethernet Adapter
- U.S. Robotics® 33.6K Fax Modem
- ★ **Microsoft® BackOffice® Small Business Server**
- HP® OpenView™ NNM Special Edition
- 6 Expansion Slots: 3 PCI/3 EISA
- 6 Drive Bays: 3 External 5.25"/3 Internal 3.5"
- ★ **7 Computer-based Software Training Courses on CD-ROM**
- ★ **1-Year DirectLine™ Network OS Support**
- ★ **3-Year Next-Business-Day On-site^a Service**
- 7x24 Dedicated Server Hardware Technical Telephone Support

\$5.65/day

(Effective Rate¹)

or Buy for \$4649

Business Lease²: \$171/Mo., 36 Mos

Order Code #250113

NETWORKING FEATURES LIKE FILE SHARING, PRINTING, E-MAIL AND INTERNET ACCESS, ALL ON AN AFFORDABLE BUSINESS SERVER.



Looking for technologies used by big business — without the big business expenses? Then take a look at this Dell® PowerEdge® 2200, specially configured with Microsoft BackOffice Small Business Server software. You get a comprehensive solution tailored to businesses of 25 users or less with applications that allow multiple users to share files, databases and printers. Plus software that allows you to fax to and from your desktop, send and receive e-mail from the office as well as from the road, and create/manage your own website.

The PowerEdge 2200 server is certified as 3Com Network Ready with a pre-installed, configured and tested network interface card. And we made it available through the business lease program³, configured to start effectively as low as \$5.65/day¹ — perfect for your growing business. Call us today or visit our website.



For a complete copy of Guarantees or Limited Warranties, please write Dell USA, L.P., One Dell Way, Round Rock, TX 78682. ¹\$5.65 effective rate based on monthly payments of \$171 over a 36-month lease. ²Business leasing arranged by Dell Financial Services L.P., an independent entity, to qualified customers. Above lease payments based on a 36-month lease, and do not include taxes, fees, shipping charges, subject to credit approval and availability. Above lease terms subject to change without notice. ³7x24-hour service guarantee provided pursuant to a service contract with a third-party provider. May not be available in certain remote areas. ⁴24X Max, 12X Min. ⁵Prices and specifications valid, neither Dell nor subject to change without notice. Pentium is a registered trademark of Intel Corporation. 3Com and U.S. Robotics are registered trademarks of 3Com Corporation or its subsidiaries. 3Com Network Ready and the 3Com Network Ready logo are trademarks of 3Com Corporation. Microsoft and BackOffice are registered trademarks of Microsoft Corporation. HP is a registered trademark and OpenView is a trademark of the Hewlett-Packard Company. Dell, the Dell logo and PowerEdge are registered trademarks and DirectLine is a service mark of Dell Computer Corporation. ©1998 Dell Computer Corporation. All rights reserved.

DELL®

TO ORDER TOLL-FREE

800-765-7785

TO ORDER ONLINE 24 HRS./DAY

www.dell.com/smallbus/pe2200

Mon-Fri 7am-9pm CT • Sat 10am-6pm CT
Sun 12pm-5pm CT • In Canada* call 800-233-0702
GSA Contract #GS-35F-4076D

Keycode #04719

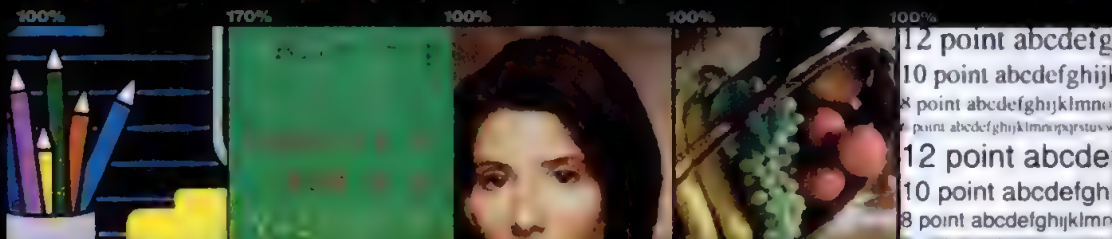
Color Output

Look Before You Leap

Whatever your needs, before investing in a new printer you need to see the output results for yourself. Here's a comparison of the color printers we tested in this roundup.

Brother HL-2400CN

Suitably bright, saturated colors. Graphics and photos suffer from dithering. Graphics show no banding in gradients. Text is crisp and clean.



HP Color LaserJet 5M

Bright, saturated colors without shine. Good graphics despite banding in gradients. Minimally acceptable photos. Text is suitably crisp and legible.



Lexmark Optra SC1275n

Fully saturated colors. Graphics show very little banding in gradients. Some photos show greater banding. Text is less crisp than that of other printers.



Panasonic KX-PS8000

Bright, saturated colors, with noticeable dithering. Photos are among the best. CMYK text is fuzzy on mixed-color and monochrome pages.



Panasonic KX-P8410

Bright, saturated colors, with noticeable dithering. Photos are among the best. CMYK text is fuzzy on mixed-color and monochrome pages.



The Color LaserJet was an average performer on our color tests, and throughput was acceptable on our monochrome tests given that the unit's engine rating is among the lowest in the group.

All told, the Color LaserJet qualifies as a good choice for a small group to share, as long as photographic output is not a high priority.—MDS

Hewlett-Packard Co., Cupertino, CA; 800-527-3753; www.hp.com/peripherals. Choose 523 at www.pcmag.com/infolink.

Lexmark Optra SC1275n

Legal-size color laser; 12 ppm monochrome, 3 ppm color; 600 by 600 dpi; 250-sheet input. \$3,800 street.

Lexmark International's Optra SC1275n is strong on performance and delivers good output quality for text and graphics. It's a solid choice as a primary printer for small or medium-size offices or workgroups, or as a supplemental printer for color jobs.

Output quality for color laser printers varies considerably. Some printers are no better than minimally acceptable on some kinds of output. Others offer uniformly good to excellent quality with all kinds of images. The samples here show how each printer performs with a range of images, using the same settings we used for the performance tests. Note that we reproduce color text on a color background at 170 percent of actual size to show detail. All the other images are shown at actual size.

On the graphics and photos, look for dithering patterns. Laser printers create most colors by dithering, which uses dots of just a few colors and varies the number of dots of each color to create the illusion of other colors. The pattern of dots can show as vertical lines, as graininess, or as a subtle but visible pattern of dots.

In the leftmost graphic in each row, check the black background for darkness and solid edge-to-edge coverage. Also look for vibrant, fully saturated colors for the pencils and the blue lines. Almost all of the printers handled this and similar images reasonably well, but note that the QMS printers offer slightly paler colors than most, which can be an issue with some images, particularly light colors on transparencies.

We printed color text on a green background and enlarged the output to make details easier to see. You probably won't use such small text in a graphic, but flaws that show clearly in 8-point text will also show less obviously in bigger

text and in thin lines. Ideally, the characters should show crisp, clean edges, with no sign of raggedness or filling in. Cyan text is the most affected in this output. The green background consists of cyan mixed with yellow, so cyan may fade into the background. Yellow stands out in any case, because the eye is sensitive to yellow. The HP Color LaserJet 5M handled this test particularly well. At the other extreme, the Lexmark Optra SC1275n and the Tektronix Phaser 360 nearly filled in the white text.

In the two photos, look for realistic skin tones and appropriate colors for the fruit. The backdrop at the right in the first photo should shade gradually from dark to light without any sudden jumps in color, like the halo effect around the hair in the HP printer's output. Also take a close look at the face, particularly the forehead and the area under the eyes. Here again, colors should change gradually. You should get a sense of three dimensionality in both the face in the first photo and the fruit in the second photo. The Tektronix Phaser 560 does particularly well on this score. If the image has a flattened effect—as with the HP and, to a lesser extent, the two QMS units—the printer isn't providing the subtle shading that gives the eye a clue to depth.

Judge the text sample as you would judge text from any laser printer. Look for crisp edges, dark text, well-formed characters, and easy readability. —MDS



Network setup and support is the same as for Lexmark's monochrome laser printers. The robust MarkVision utility is among the best available, and we had no trouble configuring the Optra on our NetWare and Windows NT networks. Physically setting up this printer, however, is a more involved process than with some of the competition. You have to install the transfer belt unit, photoconductor unit, waste toner bottle, four toner cartridges, and fuser toner roll. This isn't difficult; it just takes a lot of steps.

The toner cartridges are rated at a relatively meager 3,500 pages per color cartridge and 4,500 pages per black cartridge, which means more frequent replacement than with most competitors.

Output quality for text and graphics is excellent. Edges are sharp, thin lines and text characters are well formed, colors are fully saturated with solid areas thoroughly filled in, and gradients show only a hint of banding. The printer also did well with most of our test photos but in some cases showed hints of banding. We

Color Network Printers



Four of the color printers—the Lexmark Optra SC1275n, both of the QMS magicolor models, and the Tektronix Phaser 560—demonstrated good performance in printing monochrome text and color graphics documents. The results yielded by the two Panasonic printers and the Brother HL-2400CN were disappointing.

What the Numbers Mean

For this roundup, we put all of the color printers through a grueling suite of tests to determine their proficiency at both monochrome and color graphics tasks in a networked environment. The suite included all of the tests we administered to the monochrome printers plus a number of color-specific tests. The results enabled us to differentiate between those printers that can serve effectively for both color and monochrome jobs on your network and those that should be used strictly as supplemental printers for color.

2-Page Spreadsheet For this test, we measured the amount of time each printer took to produce a two-page Microsoft Excel 97 spreadsheet, first in monochrome and then in color (which appears on the chart below). This allowed us to experience the slowdown in performance caused by processing complex color images.

At 3.6 ppm, the Tektronix Phaser 560 posted the fastest speed in monochrome, followed closely by the Lexmark Optra SC1275n and the HP Color LaserJet 5M (each at approximately 3 ppm). All three slowed down, however, when printing the

color version of the spreadsheet. The two QMS printers were among the fastest in color, generating output at 2 ppm—the same speed as their monochrome output. Both Panasonic entries were painfully slow, at less than 1 ppm in both monochrome and color.

6-Page Presentation and 6-Page Transparency In business settings, one of the most common uses of color printers is for creating presentation slides. These tests gauge each unit's performance when printing a 6-page document onto both paper presentation media and transparencies.

Lexmark's Optra SC1275n was the fastest at printing in color onto presentation paper, with a speed of 2.3 ppm. When printing onto transparencies, however, it slowed to 0.9 ppm. Both Tektronix printers exhibited adequate performance on paper printouts, at around 1 ppm. On transparencies, the Phaser 360 was actually faster, at 1.5 ppm. The QMS magicolor 2 CX and EX were among the slowest for paper printouts at 0.2 ppm and 0.3 ppm, respectively, and also for transparencies (both at 0.3 ppm).

COLOR TESTS

Bold type denotes first place.
Effective ppm

	Rated speed	2-Page Spreadsheet	6-Page Presentation	6-Page Transparency	1-Page Newsletter
Brother HL-2400CN	4 ppm	1.0	N/A	N/A	0.1
HP Color LaserJet 5M	3 ppm	3.3	0.8	0.8	0.5
Lexmark Optra SC1275n	3 ppm	1.3	2.3	0.9	1.1
Panasonic KX-P8410	3.5 ppm	0.6	0.5	0.4	0.2
Panasonic KX-PS8000	3.5 ppm	0.6	0.4	0.3	0.2
QMS magicolor 2 CX	4 ppm	2.0	0.2	0.3	0.8
QMS magicolor 2 EX	4 ppm	2.1	0.1	0.3	0.8
Tektronix Phaser 360	6 ppm	1.2	1.1	1.5	0.8
Tektronix Phaser 560	5 ppm	2.0	1.0	0.8	0.8

N/A—Not applicable. The printer could not complete the task within 30 minutes.

MONOCHROME TESTS

Bold type denotes first place.
Effective ppm

	Rated speed	12-Page Text	12-Page Text and Graphics	Multiple Copies	Multiple Simultaneous Jobs
Brother HL-2400CN	16 ppm	10.0	3.7	1.5	3.4
HP Color LaserJet 5M	10 ppm	6.7	2.7	2.3	2.9
Lexmark Optra SC1275n	12 ppm	8.1	4.9	6.3	6.1
Panasonic KX-P8410	14 ppm	1.7	1.3	N/A	3.7
Panasonic KX-PS8000	14 ppm	1.3	1.0	N/A	3.2
QMS magicolor 2 CX	16 ppm	10.1	3.4	4.2	3.7
QMS magicolor 2 EX	16 ppm	10.7	4.7	5.6	5.6
Tektronix Phaser 360	6 ppm	1.8	1.5	4.1	1.6
Tektronix Phaser 560	14 ppm	9.1	4.0	5.0	4.2

N/A—Not applicable—The printer could not complete the task within 45 minutes.



"The NEC SuperScript 1260 wins our Best Buy seal for speed, print quality and competitive price."

-Home Office Computing, September 1997

"It doesn't slice or dice, but NEC's SuperScript 1260N brings 12ppm workgroup printing to a new low price without sacrificing options."

-Windows Sources, September 1997



"For a fast network printer, this is one of the best deals around."

-PC World, November 1997

The fat lady has sung, showered, changed and gone home.



"It's a desktop printer that's tough enough for the network and, at this price, hard to resist."

PC Computing A List, since 1995

Very simply, the SuperScript™ 1260 is one virtuoso performer. Even the critics agree that it's clearly the best value in 12 ppm printers today. With its 60MHz processor and PrintGear™ technology from Adobe®, it breezes through any network queue. And our own SharpEdge™ technology raises image quality to new highs. When you consider the SuperScript 1260 costs just \$599*, we're certain that you, too, will be singing its praises. To learn more call (800) NEC-INFO. Or, to get your free "The fat lady has sung..." t-shirt, visit www.nec.com/nectech/id. (One per location, quantities limited.) Expect more. Experience more.



* Includes \$100 (US) mail-in rebate. Price in US dollars. SuperScript is a trademark of NEC Corporation. PrintGear, SharpEdge, "Expect more. Experience more." and the NEC Technologies icon are trademarks of NEC Technologies, Inc. All other trademarks are the property of their respective holders. Adobe is a registered trademark of Adobe. © 1998 NEC Technologies, Inc.

Choose 153 at www.pcmag.com/infolink

BENCHMARK TESTS

The QMS units were the only printers that rendered the complex background images flawlessly, however; other printers showed varying levels of inaccuracy. The Brother HL-2400CN was unable to complete this test within our time limit of 45 minutes.

1-Page Newsletter Since color printers are frequently used for newsletters and fliers, we designed this test to gauge each unit's performance in printing out a one-page Microsoft Publisher file. The fastest score belonged to the Lexmark entry, at 1.1 ppm. This was trailed by the two QMS printers and the two Tektronix Phasers, all of which posted speeds of approximately 0.8 ppm. The two Panasonic printers required more than 5 minutes for this test.

50-Page Text (Results not shown.) Gauging raw print speeds for monochrome text output is useful even for testing a color printer. Although color printers are not often used to print large text jobs, the 50-Page Text test is still a good measure of the printer's raw engine speed.

The QMS magicolor 2 EX stood out, with a click-to-clunk performance of 11.5 ppm. The Brother HL-2400CN was a close second at 11.2 ppm. The Lexmark Optra SC1275n, the QMS magicolor 2 CX, and the Tektronix Phaser 560 each produced the Word document at a not-so-frustrating 9 ppm. But the HP Color LaserJet 5M, the Tektronix Phaser 360, and both Panasonic printers all showed inadequate speed for printing monochrome Word documents, with output of less than 6 ppm. The Panasonic units printed at 2 ppm or less.

12-Page Text This test allows us to measure both print speed and first-page-out delay—an important consideration if you have to print many small documents. The two QMS printers and the Brother entry posted the top speeds on this test, at close to 11 ppm, and showed no significant problems with first-page-out delay, releasing their first pages in about 20 seconds. The two Panasonic units were among the slowest on this test, printing at less than 2 ppm. This may be due to the fact that we tested all of the printers with drivers set to color print mode; it's possible that if we had set the Panasonic printers to monochrome mode, their performance might

have been closer to their rated monochrome speed of 14 ppm.

12-Page Text and Graphics Since many documents contain graphics as well as text, this test, based on a Word 97 document, provides insight into a common real-world scenario. Also, by comparing these results against the text-only results above, we can perceive the slowing effect that complex graphics processing has on

overall print speed.

The QMS magicolor 2 EX and the Lexmark Optra SC1275n tied for first place on this test, each posting a somewhat lackluster 5 ppm. The Editor's Choice—winning QMS magicolor 2 CX and the Tektronix Phaser 560 both posted acceptable speeds of 4 ppm, whereas the rest of the group achieved 2.7 ppm or less—inadequate in a workgroup setting for even supplemental use. For color, we ran a version of the file containing only color graphics. Here again, the QMS magicolor pair were top performers.

Multiple Copies and Multiple Simultaneous Jobs

These tests measure how fast the printer can clear the print queue and process a steady stream of jobs coming in from the network. They are a good indicator of a printer's overall suitability for a business workgroup environment. Among the color units, the Lexmark came out on top, with a sustained print speed of 6 ppm for monochrome jobs. The QMS magicolor 2 EX, with 80MB of memory, was second-best at 5.6 ppm, and the magicolor 2 CX was also a good performer at 4.2 ppm.—*Analysis written by S. Jae Yang*

How We Tested

We tested all of the color printers on the same test-bed as the monochrome printers. We used the vendors' recommended driver settings, and we ran all of the tests, including the monochrome test, with the drivers set to color printer mode.

In the **2-Page Spreadsheet** test, we printed monochrome and color versions of

a two-page Microsoft Excel 97 spreadsheet containing tables and various types of graphs.

We generated our **6-Page Presentation** and **6-Page Transparency** tests from a Microsoft PowerPoint 97 document and printed the results out onto presentation paper and transparencies.

The slides contain a mix of text, graphics, and complex background patterns.

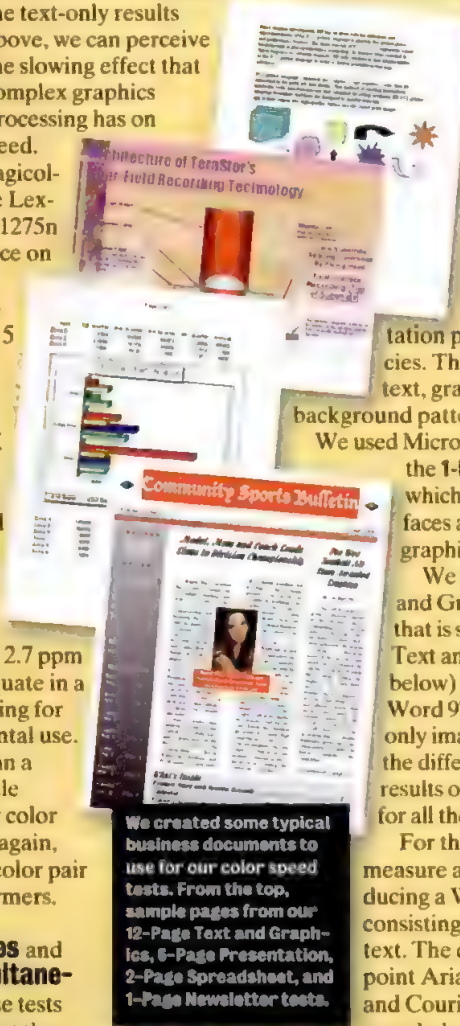
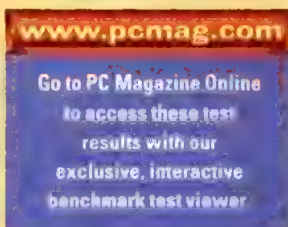
We used Microsoft Publisher 97 to print the **1-Page Newsletter** test, which contains various type faces and sizes as well as photographic images.

We also ran a **7-Page Text and Graphics** test (not shown) that is similar to the **12-Page Text and Graphics** test (see below) except that it uses a Word 97 document containing only images and no text. Despite the difference in testing methods, results on both tests were similar for all the printers.

For the **12-Page Text** test, we measure a printer's speed in producing a Word 97 text document consisting purely of unformatted text. The document contains 12-point Arial, Times New Roman, and Courier TrueType fonts, unstyled.

The **12-Page Text and Graphics** test measures a printer's speed in producing a Word 97 document with heavily formatted text and graphics. The graphics consist of two half-page bitmapped images—one a photograph, the other an image with a large amount of black.

The **Multiple Copies** test and **Multiple Simultaneous Jobs** test measure the printer's speed in producing our 12-page formatted document five times, as separate print jobs on the former test and as a single, collated print request on the latter.



We created some typical business documents to use for our color speed tests. From the top, sample pages from our 12-Page Text and Graphics, 6-Page Presentation, 2-Page Spreadsheet, and 1-Page Newsletter tests.

Cloning workstations
used to be
repetitive and redundant,
not to mention
redundant and repetitive.
Now it's just
fast.



Why spend hour after hour, day after day cloning workstation after workstation when you can install a full 250MB Win95 system on a workstation in just five minutes using Ghost Software.

Ghost is the revolutionary software solution distributed by Innovative Software that provides a fast, easy and cost-effective method of handling system migrations, upgrades and disaster recovery.

By cloning a workstation, storing the image onto another hard drive, network drive, CD-ROM, JAZ or ZIP drive, and then concurrently* restoring it to new workstations, Ghost handles the most difficult migration tasks quickly and quietly. In fact, it makes conventional file-by-file or sector-by-sector imaging methods obsolete. Plus it supports FAT12, FAT16, FAT32, NTFS,

HPFS, UNIX and Novell, and works with both SCSI and IDE devices. What's more, the Ghost Multicast version features "single transmission" technology which reduces network overhead when cloning multiple workstations.

It's easy to see why over one million seats have been sold to computer manufacturers and configuration centers, government agencies, universities, and more than half of Fortune 500 corporations.

See for yourself why Ghost is the ultimate system installer and recovery tool for Win95, WinNT and OS/2 workstations. Visit www.ghostsoft.com to download Ghost for a free 30-day trial. Or purchase it today and get one year of free upgrades and 90-day technical support. After all, life's too short to spend cloning workstations.

See us at Windows World, COMDEX/Spring '98

Choose 171 at www.pcmag.com/infolink

Innovative
software

sales@ghostsoft.com/E-mail
www.ghostsoft.com/Home Page

800-817-5119/USA
414-964-2201/Fax

*Ghost Multicast version only. Professional and Personal versions also available.

Ghost Software was developed by Binary Research Ltd. and is distributed worldwide (except in the U.K.) by Innovative Software Ltd. JAZ and ZIP drives are trademarks of Iomega Corporation. Windows95 and WindowsNT are trademarks of Microsoft Corporation. © 1998 Innovative Software Ltd. All rights reserved.

Developed by **Binary Research Ltd.**

saw much more serious banding on one test file printed from Adobe PhotoDeluxe. This turned out to be due to a bug that Lexmark found and fixed. Even with the fix, however, the photo shows some banding.

The Optra was one of the fastest units on our color and monochrome tests, with more than acceptable throughput in every category. All told, the Lexmark Optra SC1275n's combination of network utility, output quality, and speed puts it in the top tier. You can count this printer as a serious contender.—MDS
Lexmark International Inc., Lexington, KY; 800-539-6275; www.lexmark.com.
Choose 525 at www.pcmag.com/infolink.

Panasonic KX-P8410, KX-PS8000

KX-P8410: Legal-size color laser; 14 ppm monochrome, 3.5 ppm color; 1,200 by 1,200 dpi; 350-sheet input. \$3,000 street. Tested options: Ethernet card, \$799 list; 64MB RAM upgrade, \$712; 500-sheet bin, \$595.

KX-PS8000: Legal-size color laser (also color scanner, color copier); 14 ppm monochrome, 3.5 ppm color; 1,200 by 1,200 dpi; 350-sheet input. \$10,000 street. Tested options: As above.

Panasonic Computer Peripherals Co.'s latest entries into the network printing market are really the same device bundled into two different packages. The KX-P8410 is a color laser printer that boasts high-quality output and high-capacity toner cartridges at a competitive price (though the ultra-low base price is a tease—you'll need to figure in the pricey network adapter and the cost of more RAM). The KX-PS8000 is exactly the same printer but adds a color scanner, which transforms the unit into a color laser copier as well. Sluggish performance is the only reason we hesitate to recommend either unit wholeheartedly.

For both printers, network setup is standard fare and should only take a few minutes. Panasonic's Network Printer Manager lets you configure the printer and printer server, print a configuration page, add a printer, get server statistics and status, and more.

The Matsushita engines are a joy. Assembling the printer portion involves little more than sliding in the four toner cartridges. With a claimed 10,000 pages per color cartridge and 12,000 pages per black cartridge, you won't have to replace them too often.

Adding the 2,400- by 600-dpi scanner to the KX-PS8000 is also straightforward. You can either stack the scanner on top of the printer and lock it in place or leave it on a flat surface; it's connected to the printer by a SCSI cable. You can't use the scanner to scan to the network. You can, however, connect it to a nearby computer with a SCSI cable and use it as a standalone device. A front panel on the scanner lets you use the system as a walk-up color laser copier.

Output quality for both printers is first-rate. Text and



Panasonic's KX-PS8000 has first-rate text and graphics output but somewhat disappointing print speed. The add-on scanner module (on top) is a welcome highlight.

graphics offer sharp edges, the solid areas are well filled in, gradients show only subtle banding, dithering is all but invisible, and photos are close to true photographic quality. Print speeds were disappointing on our tests, however. If you set the driver for color graphics, it will print everything—even black text—in color, using cyan, yellow, and magenta to produce black. You can get faster performance by using the driver's monochrome setting, but even Panasonic says that most people will likely want to print everything in color mode. The company says it's working on an intelligent driver that will switch between monochrome and color as appropriate; there is

no announced shipping date for the new driver, however.

Both printers do a good job of delivering on their promises, and the KX-PS8000 in particular doesn't have much competition in this price range. We'll give both of these units a much more enthusiastic recommendation when the promised intelligent driver is available to improve real-world performance.—MDS

Panasonic Computer Peripherals Co., Secaucus, NJ; 800-742-8086, 201-348-7000; www.panasonic.com/alive. Circle 529 at www.pcmag.com/infolink.

QMS magicolor 2 CX, magicolor 2 EX



2 CX: Legal-size color laser; 16 ppm monochrome, 8 ppm color; 600 by 600 dpi; 250-sheet input. \$3,200 street.

2 EX: Legal-size color laser; 16 ppm monochrome, 8 ppm color; 2,400 by 600 dpi; 250-sheet input. \$4,500 street.

Thanks to powerful networking architecture and a new-generation color laser engine from Hitachi, QMS's magicolor 2 printers are formidable contenders in the mainstream color laser market. The QMS magicolor 2 CX—an Editors' Choice here—is designed for general business output, while the QMS magicolor 2 EX provides up to 2,400- by 600-dpi resolution for proofing and prepress applications. Both are excellent choices and could serve as the only shared printer in a medium-size office or workgroup. And their prices are true bargains: The Ethernet cards and all the RAM you're likely to need are included.

These color lasers come standard with the same suite of first-rate network management and configuration utilities as the QMS 2425 Turbo EX we review in the monochrome printers section. QMS's impressive new Windows 95 client driver has gas gauge controls for monitoring toner levels along with support for watermarks, thumbnail printing, and automatic color matching.

Output quality for typical business graphics and photographs at 600 dpi was good. Colors tended to be a little paler than those from the class-leading Tektronix Phaser 560 but were still fine for charts and presentations. The 2,400- by 600-dpi out-



The Editors' Choice-winning QMS magicolor 2 CX offers fine output and worry-free network management software. It also comes standard with a rich feature set.

"HOUSTON, YOU HAVE A PROBLEM."



The new HP
NetServer LXr Pro 8

While Compaq's 8-way server languishes in a six-month countdown, HP's LXr Pro 8 has already left the pad. Optimized for the NT operating system, the HP LXr Pro 8 is the first server from a top-tier vendor to deliver the 8-way Intel® Pentium® Pro processor, and the only server to deliver the next generation of I/O throughput with I2O disk array technology. It's one small step for HP, one giant leap for IT. Visit us at www.hpresource.com/lxrpro8 or call 1-800-533-1333.

Optimized for Microsoft Windows® NT Server 4.0 Enterprise Edition operating system

8-way Intel 200 Pentium Pro processor for higher power and performance

Planned upgrade to next generation CPU technology
8GB SDRAM for fast memory for large database applications

Next generation of I/O throughput with I2O disk array technology

Fibre channel technology for better availability and higher scalability

Option: seven RAID levels for superior data protection

Hot-swappable power supplies and cooling fans for maximum uptime

Advanced cooling pipe design providing highly reliable CPU temperature control



HEWLETT
PACKARD

SUMMARY OF FEATURES

Color Network Printers



■ YES ■ NO

	Brother HL-2400CN	HP Color LaserJet 5M	Lexmark Optra SC1275n	Panasonic KX-P8410	Panasonic KX-PS8000	QMS magicolor 2 CX
Street price of basic configuration	\$3,500	\$5,200	\$3,800	\$3,000	\$10,000	\$3,200
Street price of tested configuration	\$4,000	\$5,200	\$3,800	\$4,950	\$10,000	\$3,200
Rated engine speed, monochrome/color	16 ppm/4 ppm	10 ppm/3 ppm	12 ppm/3 ppm	14 ppm/3.5 ppm	14 ppm/3.5 ppm	16 ppm/4 ppm
Printer-engine manufacturer	Hitachi	Konica	Minolta	Matsushita	Matsushita	Hitachi
Base/maximum RAM	32MB / 112MB	36MB / 76MB	32MB / 192MB	8MB / 72MB	16MB / 80MB	24MB / 384MB
Tested RAM	32MB	36MB	32MB	72MB	80MB	24MB
Best standard resolution	2,400 x 600	300 x 300	600 x 600	600 x 600	600 x 600	600 x 600
Best resolution with memory upgrade (RAM needed)	2,400 x 600 (32MB)	300 x 300 (36MB)	600 x 600 (32MB)	1,200 x 1,200 (24MB)	1,200 x 1,200 (24MB)	2,400 x 600 (68MB)
Processor model/speed (MHz)	Fujitsu Sparc Lite / 100	AMD 29040 / 40	Intel i960 / 66	Intel i809060 / 16	Intel i809060 / 16	NEC VR4300 / 133
Highest PCL/Postscript supported	PCL 6/Level 2	PCL 5c/Level 2	PCL 6/Level 2	N/A	N/A	PCL 5c/Level 2
Drivers and Software						
Microsoft Windows 95/3.x/NT drivers	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■
OS/2 Warp / Mac OS / Unix drivers	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■
Printer-management utility	High Resolution Controller	WebJet Admin	Mark Vision	Panasonic Printer Status	Panasonic Printer Status	CrownAdmin 3
Runs under NetWare / Windows NT / OS/2 Warp	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■
Runs under Mac OS/Unix	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■
Can see/control different printer brands	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■
Paper-jam/paper-low/paper-out alerts	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■
Toner-low/toner-out/usage-tracking alerts	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■
End-user applets available:						
Windows 95/NT	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■
OS/2 Warp / Mac OS	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■
Graphical printer status/tray selection	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■
Thumbnail/booklets/watermarks	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■
Pantone-certified	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■
Other color management support	Windows 95 ICM	ColorSmart	AGFA FotoTune, ColorSync 2.0, Windows 95 ICM	Hyper-Tetra	Hyper-Tetra	Color Scale, Qcolor, TCM
Paper Handling						
Rated duty cycle (pages per month)	25,000	30,000	20,000	25,000	25,000	25,000
Number of standard paper inputs/total capacity	1 / 250 sheets	2 / 250 sheets	3 / 250 sheets	2 / 350 sheets	2 / 350 sheets	1 / 250 sheets
Maximum printable area on letter-size paper (color)	8.1 x 10.6 inches	8.2 x 10.7 inches	8.2 x 10.7 inches	8.0 x 10.5 inches	8.0 x 10.5 inches	8.1 x 10.6 inches
Prints on transparencies/envelopes	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■
Heaviest paper stock accepted	43 lb.	24 lb.	43 lb.	90 lb.	90 lb.	90 lb.
High-capacity paper cassette	250-sheet, \$399	500-sheet, \$445	250-sheet, \$479	500-sheet, \$595	500-sheet, \$595	250-sheet, \$479
Hard disk (capacity/list price)	None	None	840MB / \$499	None	None	340MB / \$799
Disk can be used for storing fonts/forms	N/A	N/A	■ ■ ■ ■	N/A	N/A	■ ■ ■ ■
Rated toner-cartridge capacity, black/color	10,000 / 6,000	3,000 / 3,000	4,500 / 3,500	12,000 / 10,000	12,000 / 10,000	10,000 / 6,000
Estimated cost per page:						
5% black coverage	2.6 cents	1.8 cents	2.3 cents	3 cents	3 cents	2 cents
10% / 25% color coverage	5.2 cents / 13 cents	3.3 cents / 8.3 cents	8 cents / 12 cents	5 cents / 12 cents	5 cents / 12 cents	7 cents / 14 cents
75% / 100% color coverage	39 cents / 52 cents	25 cents / 33.5 cents	32 cents / 42 cents	37.5 cents / 50 cents	37.5 cents / 50 cents	37 cents / 48 cents
Interfaces and Networking						
Ethernet adapter (IPX/SPX and TCP/IP)	\$399 list	Included	Included	\$799 list	\$799 list	Included
Card supports EtherTalk/NetBEUI/NetBIOS	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■
Token-Ring adapter	None	\$619 list	\$599 list	None	None	\$649 list
Supports more than one installed network adapter	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■
LocalTalk/SCSI/Serial port	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■
Service and Support						
Technical-support hours (eastern time)	6:00 A.M.-9:00 P.M. M-F	6:00 A.M.-10:00 P.M. M-F; 9:00-4:00 Sat.	9:00-9:00 M-F; Noon-6:00 Sat.	8:00-5:00 M-F	8:00-5:00 M-F	9:00-7:00 M-F

N/A—Not applicable: The product does not have this feature. * Pages per color stick. Each product has a one-year warranty.

put of the EX impressively erased nearly all of the imperfections found in the 600-dpi output.

On our suite of performance tests, the CX and EX continued to perform similarly, scoring near the top of the list alongside the speedy Lexmark Optra SC1275n and the Tektronix Phaser 560. Both QMS units had poor print times on only one speed score: the 6-Page Presentation Slides test. The QMS printers were

among the few units capable of rendering the more complex images on these slides accurately, however.

If you need a speedy laser printer with fine color output and robust management software for a workgroup environment, these QMS magicolor 2 printers are solid choices.—DT
QMS Inc., Mobile, AL; 800-523-2696; www.qms.com. Choose 530 at www.pcmag.com/infolink.

QMS magicolor 2 EX	Tektronix Phaser 360	Tektronix Phaser 560
\$4,500	\$3,700	\$4,000
\$4,500	\$4,100	\$5,500
16 ppm/4 ppm	6 ppm/6 ppm	14 ppm/5 ppm
Hitachi	Tektronix	Mitsubishi
80MB / 384MB	24MB / 48MB	8MB / 72MB
80MB	24MB	40MB
2,400 x 600	800 x 450	600 x 600
2,400 x 600 (80MB)	800 x 450 (24MB)	1,200 x 1,200 (40MB)
NEC VR4300 / 133	Motorola / 100	AMD / 33
PCL 5c/Level 2	PCL 5/Level 3	PCL 5/Level 2
■ ■ ■ ■ ■ ■ CrownAdmin 3	■ ■ ■ ■ ■ ■ PhaserPrint Admin	■ ■ ■ ■ ■ ■ PhaserPrint Admin
■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■
■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■	■ ■ ■ ■ N/A N/A ■ ■ ■	■ ■ ■ ■ N/A N/A ■ ■ ■
Color Scale, Qcolor, TCM	Windows 95 ICM	Windows 95 ICM
25,000	20,000	25,000
1 / 250 sheets	1 / 200 sheets	2 / 350 sheets
8.1 x 10.6 inches	8.1 x 10.5 inches	8.2 x 10.6 inches
■ ■ ■	■ ■ ■	■ ■ ■
90 lb.	80 lb.	44 lb.
250-sheet, \$479	825-sheet, \$495	500-sheet, \$595
540MB / included	2.1GB / \$795	2.1GB / \$795
■ ■ ■	■ ■ ■	■ ■ ■
10,000 / 6,000	1,000 / 1,000*	12,000 / 10,000
2 cents	1.5 cents	2.4 cents
7 cents / 14 cents	5 cents / 10.4 cents	8.4 cents / 15.8 cents
37 cents / 48 cents	28.1 cents / 36.9 cents	40.5 cents / 52.9 cents
Included	Included	\$495 list
■ ■ ■	■ ■ ■	■ ■ ■
\$649 list	\$595 list	\$895 list
■ ■ ■	■ ■ ■	■ ■ ■
■ ■ ■	■ ■ ■	■ ■ ■
9:00-7:00 M-F	9:00-8:00 M-F	9:00-8:00 M-F

Tektronix Phaser 360, Phaser 560

360: Legal-size solid ink; 6 ppm monochrome, 6 ppm color; 800 by 450 dpi; 200-sheet input. \$3,700 street.

560: Legal-size color laser; 14 ppm monochrome, 5 ppm color; 1,200 by 1,200 dpi; 350-sheet input. \$4,000 street. Tested options: Ethernet adapter, \$495 list. These two offerings from Tektronix live up to the company's

reputation for top-notch graphics and color quality. The Tektronix Phaser 560 is a color laser that delivers excellent results for everything from text to photos; its solid performance and high-capacity toner cartridges make it a good choice for medium-size and large workgroups. The Tektronix Phaser 360 is a drum-based solid ink printer, with output a step below that of the 560 for photos but a step above for graphics. Because of its slow monochrome print speed, however, the 360 is better for small workgroups or as a supplemental color printer.

Network setup is easy and essentially the same for both units. For NetWare, for example, use the OS's own tools to install a print server, printer, and print queue; then configure the printer either with the PhaserShare Administrator or with the firmware-based PhaserLink Web pages. The software is not quite up to the level of that from HP, Lexmark, and QMS, though. For example, PhaserLink provides a status page but no automatic alerts.

The 560 is physically easy to set up: Just slide in the four toner cartridges and you're ready to go. Its claimed cartridge capacity of 10,000 pages per color cartridge and 12,000 pages per black cartridge should mean you'll need to replace them much less often. Output quality from the 560 is among the best of all the color lasers in this roundup. Photos are close to true photographic quality, graphics and text have crisp edges, and text characters have well-formed thin lines. Solid areas in graphics are evenly filled in, colors are brilliant and fully saturated, and gradients show only a hint of banding. The 560 was an average performer on our speed tests.

We did uncover one output problem on our tests: a dark band that appeared on the bottom inch of some but not all full-page graphics and photos. Tektronix says this is a recently discovered problem. Whether it appears varies with the paper used, the darkness of the image, and even with the particular unit. Tektronix also says that a fix will be shipping by the time you read this. Older printers will be retrofitted with the fix for free.

The 360—which is even easier to assemble than the 560—ships with its color ink sticks, called Color Stix, already loaded. All you need to do before you print is plug the unit in and give the ink sticks time to melt. But be aware that you can't duplex with this technology, because the wax on the first side of the page will melt if you feed it through again. And because of the wax, the pages don't slide across glass very well and tend to jam the automatic document feeder of a typical office copier.

Output quality is marginal for photos, with dithering obvious even at the 800- by 450-dpi setting. Graphics and text offer suitably crisp edges and well-formed thin lines and text characters. Colors are brilliant and fully saturated, though you can see dithering with some colors in solid areas. For color jobs, the 360 held its own in speed tests against most of the color laser units. It is rated at only 6 ppm for monochrome, however, and generally trailed the field.

Unless high-quality photo output is important to you, the 360 is a good choice as a supplementary printer. If you're looking for the best possible output quality and can live without fancy network and administration tools, the 560 should be on your short list.—MDS

Tektronix Inc., Wilsonville, OR; 800-835-6100, 503-682-7377; www.tek.com/color_printers. Choose 531 at www.pcmag.com/infolink. 



It's no surprise that a Japanese company would design the world's most space-efficient computers.

Just how big does your computer have to be? This might seem un-American, but you don't need all the room in the world to accomplish great things. Consider the size of the human brain for a moment. On the grand scale of life it's relatively small, still it remains the most remarkable mechanism in the known universe. And while the other big computer companies go on making big computers, Akia is here to prove performance doesn't have to be regulated by sheer size and mass.

Akia understands you have enough clutter to cut through at work without having to deal with an aircraft carrier plopped on your desk. And that's not even mentioning the jungle of power cords and cables piling up waiting to envelope you and your co-workers. While Akia LCD systems take up to 80% less space, they're still powerful desktop systems which feature the latest Pentium II processors and huge amounts of storage making it the envy of its bigger neighbors.

Maybe it's not your boss giving you a headache every day. Maybe it's your CRT. Eye comfort is another good reason to chose Akia beyond just high performance tucked into attractive, streamline designs. The Fusion OneBox delivers brilliant, high resolutions with less glare and no flicker. Rest assured, it works a lot better than aspirin. It emits less radiation, gives off less heat and uses less electricity, all of which will make you happier and healthier.

Order Direct By Calling Toll Free

800-239-6854

Visit Our Website and Our Online Store

www.akia.com

Sales Support Hours: Mon - Fri: 8am - 6pm (CT)

Customer Support Hours: Mon - Fri: 8am - 6pm (CT)

30-day unconditional money-back guarantee from date of shipment

11406 Metric Blvd., Ste. 190, Austin, Texas 78758

TEL: 512-339-4804 FAX: 512-339-4886

akia
corporation



Fusion™ OneBox™

15.5" (w) x 15.25" (h) x 7.7" (d)

- Integrated 14.5" TFT Active Matrix Color LCD
- 233MHz Pentium® II Processor
- 32MB SDRAM (512MB Max)
- 4.2GB Ultra ATA Hard Drive
- 20X Max Variable CD-ROM Drive
- ATI 3D Rage Graphics w/ 4MB SGRAM
- 16-bit Stereo Sound System w/ Built-In Speakers
- Integrated Ethernet LAN 10/100 Base-T
- Universal Serial Bus Connections
- Akia Win '95 Keyboard & Mouse
- Microsoft® Windows® 95 Pre-installed

Complete system only **\$2,899** w/ Integrated 56K Modem *3399

- 266MHz Pentium II Processor
- 64MB SDRAM
- 6.4GB Ultra ATA Hard Drive

Complete system only **\$3,299** w/ Integrated 56K Modem *3399

add *200 for 333MHz Processor

add *200 for 8.4GB Ultra ATA Hard Drive

add \$119 for MS Windows NT Workstation 4.0

Business Lease *105/month for 36 months*

*Akia Computer Corporation is not responsible for omissions or errors in typography or photography. Prices and specifications subject to change without notice. Prices do not include shipping and handling and any applicable taxes. 30-day money back policy does not include return freight and original shipping handling charges. The Intel Inside logo and Pentium are registered trademarks of Intel Corporation. MS Windows and Windows logo are registered trademarks of Microsoft Corporation. Copyright All Rights Reserved. Akia, Mystique, Radiance, Fusion, OneBox and the Akia logo are trademarks of Akia Computer Corporation. Business leasing arranged by Copelco Capital, an independent entity. In qualified customers, lease payments based on 36 month lease, and do not include taxes, fees, shipping, subject to credit approval and availability. Subject to change without notice.

Choose 108 at www.pcmag.com/infolink

Personal ISDN Routers



**These kinder,
gentler ISDN routers
let you share
connections across
a small office or
home LAN.**

By Les Freed

Once again, supply rushes in to meet demand. Just as ISDN is reaching some critical mass in large installations, ISDN router vendors have recognized a need on the low end for faster Internet access. The result is a new class of "personal" ISDN router that makes it easy for a small network to share one 128-Kbps ISDN connection.

As the moniker suggests, this kinder, gentler class of ISDN router is geared to users with limited networking experience. To use one of these devices, you must connect your PCs with Ethernet cards and cable (if they aren't already connected). To connect more than two PCs, use a simple Ethernet hub.

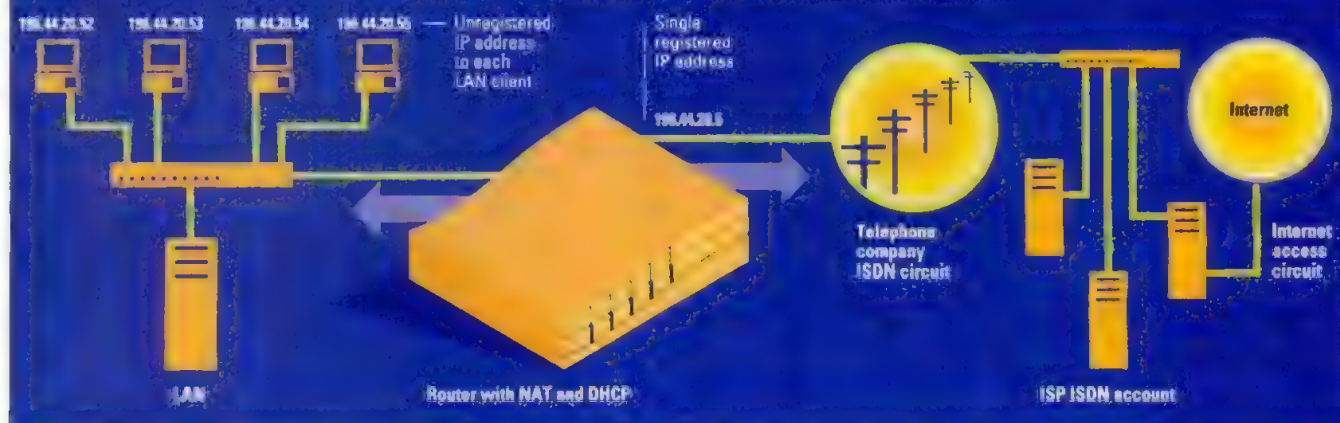


IN THIS REVIEW

ACC Congo Personal Router.....	176
Arescom Apex 1100-3.....	180
Ascend Pipeline 75.....	184
Bay Networks Nautica 200.....	188
Cisco 766.....	192
Ramp Networks WebRamp Entré.....	192
Shiva AccessPort 2.0.....	197
3Com OfficeConnect ISDN LAN Modem.....	199
ZyXEL Prestige 100.....	199
ZyXEL Prestige 128.....	199
Suitability to Task.....	174
Editors' Choice.....	175
Thumbs Up/Thumbs Down.....	176
Getting Set Up with ISDN.....	178
ISDN Sharing, Cheap.....	180
ISDN Sharing, Software-Style.....	184
Performance Tests.....	186
Alternative Technologies for Fast Connections.....	188
Summary of Features.....	196

How DHCP and NAT Let You Share a Single ISDN Connection

The routers we tested all have Dynamic Host Configuration Protocol (DHCP) and Network Address Translation (NAT) capabilities, which let you share a single ISDN connection across the LAN. DHCP assigns each network client an unregistered IP address that is not visible on the Internet. NAT routes packets from the single registered Internet address to all the LAN clients.



The devices are small, and nearly all provide wizard-based software, thorough documentation, and even online tutorials that make installation and configuration easy. Two of the routers carry price tags under \$500 (street), a price unheard of only a year ago. Others aren't much more expensive than that.

Lower price and improved usability are important changes, but the technology driving these products is IP *Network Address Translation* (NAT). Though NAT has been available for 18 months, it is only now becoming a standard feature of ISDN routers. NAT makes sharing a single ISDN line on a LAN easy: It lets the ISDN router funnel all LAN-to-Internet traffic through a single IP address. The technology reduces ISP access costs dramatically, because you pay for only one IP address to use among multiple systems. Before the advent of NAT, ISPs

charged more for ISDN router accounts.

For this story, we focused on single-line ISDN routers that provide NAT, Dynamic Host Configuration Protocol (DHCP) services, an internal ISDN terminal adapter (TA), and two plain old telephone service (POTS) ports for connecting additional analog devices—and that have list prices under \$1,000. We turned up ten ISDN routers from nine companies. In addition, we tested two alternative solutions for sharing a single ISDN line (see the sidebars “ISDN Sharing, Cheap” and “ISDN Sharing, Software-Style”).

WHY ISDN?

When 56K analog modems became available last year, many industry observers predicted a swift death for ISDN. Though it was first introduced back in the early eighties, ISDN has had trouble catching on in a big way, even though its connec-

tions are faster, more consistent, and more flexible than any analog connection.

With both channels in use, ISDN provides roughly two and a half times the throughput of a 56K modem. ISDN's *latency time*—the time it takes a data packet to travel from a PC to a remote server and back—is also much faster. And ISDN calls typically connect in under half a second, compared with 30 seconds or more for high-speed modems. The last point is especially important: ISDN routers usually dial and disconnect on an as-needed basis.

Each ISDN line has three channels—a 16-Kbps signaling D-channel (data channel) and two 64-Kbps B-channels (bearer channels). The D-channel shuttles dialing, caller ID, and ringing information between the user's ISDN equipment and the local phone company and isn't typically used for data. The ISDN router can

SUITABILITY TO TASK

	ACC Congo Personal Router	Arescom Apex 1100-3	Ascend Pipeline 75	Bay Networks Nautica 200	Cisco 766	Ramp Networks WebRamp Entré	Shiva AccessPort 2.0
Ease of setup	Good	Excellent	Excellent	Good	Excellent	Excellent	Excellent
Features	Good	Fair	Excellent	Good	Excellent	Excellent	Excellent
Performance	Good	Good	Good	Good	Good	Good	Good

Ease of setup: We evaluate all the steps necessary to get an ISDN router configured and operational. Documentation should be clear and complete. We like electronic documentation, providing the router also comes with a printed “getting started” manual. The software should guide the user through setup, either via a wizard or through a simple graphical interface. The preferred method combines software support to handle most

operations with a serial interface for troubleshooting. The package must include all necessary cables and ports, which should be well marked. We give extra credit for color-coded cabling and ports. We are impressed by routers that configure the SPIID automatically.

Features: In addition to the ability to route IP packets to an ISP, other features can make the device more useful. Each

router we reviewed includes two POTS ports; we look at how the router handles a call to a fax machine connected to a POTS port. Ideally, the device switches all traffic onto one B-channel, freeing up the other for the incoming call. We also check whether a caller ID box attached to the router provides data on incoming analog calls, and we evaluate the logging and troubleshooting tools included. We give extra credit to routers

EDITORS' CHOICE

use the B-channels for voice calls made to either ISDN or analog phones, as well as for data and video. Each channel has a separate phone number, allowing you to place voice calls on one channel while sending or receiving data over the other.

An ISDN router can also aggregate (bond) the two B-channels into one 128-Kbps channel by using Multilink PPP (MP), a close cousin of PPP, the protocol used by Windows 95's Dial-Up Networking. The Bandwidth Allocation Control Protocol (BACP), an adjunct protocol to MP, lets ISDN routers add the second channel to a connection or drop it, as voice and data traffic warrants. All of this results in a fast, flexible Internet connection.

ISDN is available from virtually all telephone companies, although installation, monthly, and usage charges vary by region. Phone companies bill for ISDN calls by the call, by the minute, or both; other providers charge a flat rate. In many locations, a single ISDN line with unlimited usage costs less than the price of two analog phone lines. Note, though, that you incur the charges in addition to your ISP account charges (for further details, see the sidebar "Getting Set Up with ISDN").

ISDN ROUTER BASICS

If we've intrigued you but you're not certain how to connect two or more computers for sharing ISDN, here's a quick primer. Typically, implementing ISDN involves installing an ISDN TA in your PC, which allows that PC alone to benefit from the high-speed connection. To share the ISDN connection using a ISDN router, the PCs must be connected together on a LAN. The ISDN router provides an Ethernet interface that allows all network

Editors' Choice

• Shiva AccessPort 2.0



One thing's for sure: These aren't your father's routers. Al-

though some products in our roundup, such as the Cisco 766, are better suited to experienced users, most of the products try to satisfy the needs of new and experienced users alike. The Shiva AccessPort 2.0 is both powerful and simple to use, rife with features and capabilities that speak to both camps. It earns our Editors' Choice.

Beginning with installation, Shiva does everything right in catering to the networking novice. From the little things—such as color-coded cables—to the wealth of helpful installation documentation (which include a QuickTime movie), the AccessPort rolls out a thick welcome mat for networking newcomers. Although most vendors understand the importance of

a good installation wizard, many wizards included in the products we tested still had a few kinks to be worked out. Shiva's software was the best; it was easy to use and functioned smoothly, auto-detecting SPID and switch type without a hitch. Moreover, unlike some router software that holds your hand through the initial stages then drops you in front of the command-line interface to perform additional tasks, the Shiva Monitor lets you perform even complex configuration and monitoring tasks from its point-and-click interface.

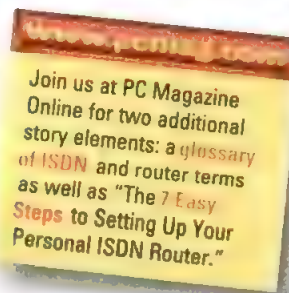
Right on the heels of the AccessPort comes the Ramp Networks WebRamp Entré, which earns an honorable mention. Its WebRampWiz software is as easy to use as the AccessPort's software, presenting a seamless transition from the installation wizard into the administration GUI. The WebRamp Entré lacks a few of the time-savers that the AccessPort offers, such as auto-SPID and switch-information detection, but among its notable features are an included four-port Ethernet hub and a handy uplink switch that negates the need for confusing crossover cables.

clients to have access to the ISDN service.

The exact bandwidth available to any one user varies depending on the number of users sharing the ISDN router and the type of application each is running. To illustrate, consider four users sharing a ISDN router: Three are scrolling through an already downloaded Web page when the fourth loads a browser to check an airline schedule. At that instant, the fourth user receives all the bandwidth, because the other three users are essentially idle. Now imagine that one user is downloading a large file. If no one else is online, that user will benefit from the full bandwidth. But if a second user begins downloading a large file, the bandwidth available to each user drops to around 64 Kbps.

We found performance wasn't a differentiating factor among these routers. In

testing, each delivered about 120 Kbps of throughput. This number falls a bit short of the 128 Kbps theoretically available, but this is more the result of LAN overhead (including NAT and DHCP processes) than of deficiencies in the line or router.



DID YOU SAY ROUTER?

In the past, ISDN router installation would often degenerate into an aggravating, all-day affair. Unlike an analog modem that you simply plug into your existing phone line, each ISDN device must be individually configured. The device must

know the phone number(s) of the line it's connected to, the type of phone company central-office switch, and the Service Profile Identifier (SPID).

A SPID is a passwordlike number assigned to each ISDN B-channel by the phone company. When a router can't pro-

3Com OfficeConnect ISDN LAN Modem	ZyXEL Prestige 100	ZyXEL Prestige 128
Good	Fair	Fair
Excellent	Fair	Fair
Good	Good	Good

that include file filtering and compression

Performance To test speed, we look at how quickly each router downloads a 130K uncompressed file. All the routers performed acceptably, combining the two B-channels to deliver throughput in the 110- to 120-Kbps range. The routers also must be able to split the throughput evenly between two clients. For details, see "Performance Tests: Personal ISDN Routers."

Thumbs Up/Thumbs Down

Some features of personal ISDN routers improve usability, while others don't quite make the grade.



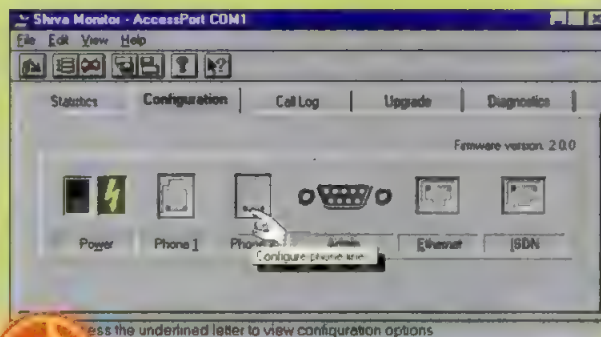
SINGLE LED: Though we like the Bay Networks Nautica 200's compact size, its single LED provides little intuitive information. Deciphering the different pattern flashes and color changes requires an unhealthy dependence on the owner's manual.

REAR LED: This is another simple idea that can really make a difference. The Cisco 766 has a rear LED to let you know what's going on even when you're playing with the connectors.



DIFFICULT BUTTON

The Congo Personal Router has a useful button that turns off the data while leaving the voice lines open. But we could never tell whether it was on or off: The oddly designed button didn't noticeably respond to the touch.



POINT-AND-CLICK CONFIGURATION: Administering an ISDN router doesn't have to be a daunting task. Products such as the Shiva AccessPort 2.0 provide excellent GUIs that make regular maintenance a breeze.



COLOR-CODED CABLES: Though the concept is simple, color-coded cables make even an easy setup go more quickly and smoothly. Only two of the products we tested include them: the Shiva AccessPort 2.0 and the 3Com OfficeConnect ISDN LAN Modem.

vide the correct SPID, the phone company's switch won't talk to it. The ISDN router must also know the phone number, user name, and password information for your ISP account. To complicate matters further, many old-style ISDN routers use a complicated command-line interface, which makes installation as well as ongoing configuration changes difficult.

By contrast, most personal ISDN routers include PC-based software that greatly simplifies the installation process. They all provide GUI-based installation and configuration, and all but the ZyXEL models provide wizard-based installation. Some installation programs—notably, those from Arescom, Bay Networks, Cisco, and 3Com—even auto-configure the phone company switch and SPID

information.

All ISDN routers we tested also provide two RJ-11 POTS telephone jacks. The jacks act like conventional phone lines, and they allow sharing of the ISDN's two voice/data channels to make and receive phone calls when the channels are not being used to transmit data. You can use them to connect telephones, answering machines, fax machines, and anything else that has a standard modular phone plug. The Cisco 766 also includes an ST jack that lets you plug an ISDN phone or a Group IV fax machine into the unit.

In case you have ISDN or are close to getting it, now's the time to jump. One of these personal ISDN routers is the right choice for you.

ACC Congo Personal Router

If you're building a mini communications center for a small office, you'll find the ACC Congo Personal Router (\$645 list, \$340 street) has everything you need. And if voice carries equal weight with data in your ISDN needs, the Congo is an even better choice, because it bundles an impressive package of telephony software. But the lack of GUI access to all administrative functions will keep some beginners away.

The ISDN, Ethernet, and POTS ports are packed in a modem-size box, and good online documentation comes in PDF format on the included CD-ROM. The Congo also includes all required cables for connecting to your network, ISDN line, and serial interface for terminal-based configuration sessions. The unit's LEDs will keep you well informed of analog, Ethernet, and ISDN activities.

A unique feature of the Congo is an on/off switch that lets you disable ISDN service while keeping the regular phone

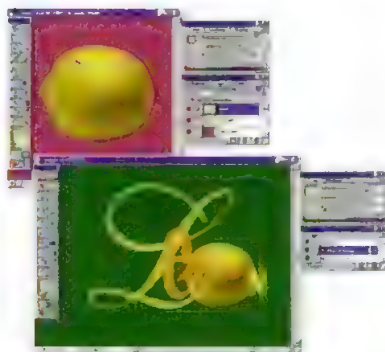
Our Contributors: LES FREED and BRUCE BROWN are contributing editors of *PC Magazine*. FRANK J. DERFLER, JR., is the senior networking editor of *PC Magazine*. JEFFREY G. WITT is technical director of PC Magazine Labs. KRISTINA DENIKE was the project leader, and TONI F. KISTNER was the associate editor in charge of this story.

ADOBE® ILLUSTRATOR® 7.0 *for WINDOWS®*

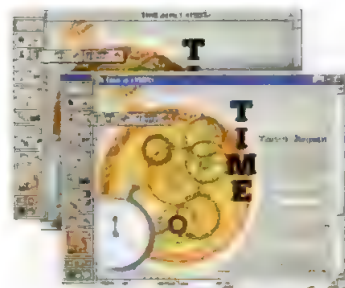
YOU HAVE IDEAS THAT STAND OUT.



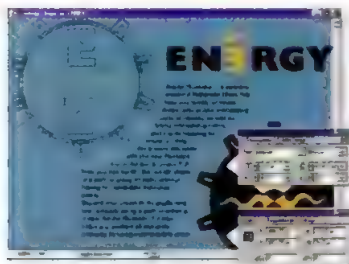
NO JOB IS TOO BIG OR TOO SMALL. From the simplest graphics to the most complex artwork, new Adobe Illustrator 7.0 for Windows handles just about all your illustration jobs.



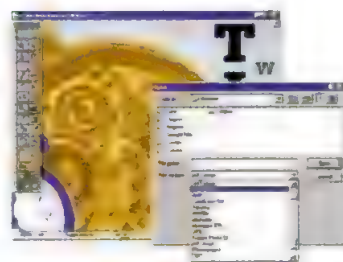
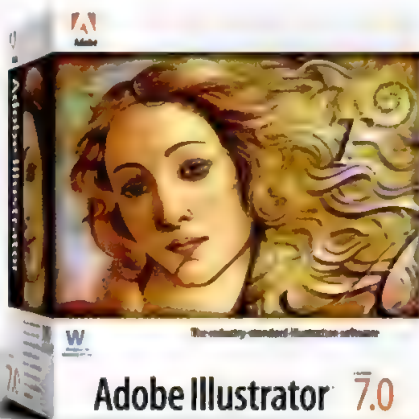
WORKS SEAMLESSLY WITH ADOBE PHOTOSHOP® and Adobe PageMaker® like no other illustration software. You learn and work faster, with the same user interface, including shortcuts and menus. Even drag and drop among all three programs.



WINDOWS AND MACINTOSH®—SAME GREAT FEATURES. It's never been easier to share files across platforms with colleagues, clients and service bureaus.



PRECISE CONTROL OF ARTWORK AND TYPE. Create, transform and align elements just the way you want. Adjustable "snap-to" guides and grids make layout design easier. You can even wrap text around any shape or run type along any line.



UNMATCHED COMPATIBILITY. Input from anywhere, output for everywhere. Support for more than 20 image, graphics and text formats, including TIFF, WMF, CDR, PhotoCD™, GIF89a and MS-Word—plus Adobe PostScript® printing, too.

NOW YOU CAN GET THE SOFTWARE TO PROVE IT.

From its intuitive interface to its powerful graphic capability, Adobe Illustrator 7.0 works the way you do. It gives you simple, yet powerful filters and effects to put a fresh look on all your graphics—just click and create. Grab input from file formats you're familiar with. TIFF, CDR, PhotoCD, GIF89a, Microsoft Word, over 15 formats in all. With support for Postscript®, and both RGB and CMYK color, your ideas can see the light of day, just as you intended, virtually anywhere: print, digital or Web. In the name of simplicity, Adobe Illustrator, Photoshop and PageMaker use the same intuitive graphic interface. So when you've mastered Illustrator, basically you've mastered them all. Drag. Drop. Stand out. Because blending in isn't an option.

Call 1-800-649-3875 ext. 41900 or visit www.adobe.com/prodindex/illustrator.



Getting Set Up with ISDN

Installing ISDN is a complicated, multistep process. First, you must request ISDN service from the phone company, which then installs an ISDN line at your location. Next, you must configure the line to work with your LAN devices. You'll also need to establish an ISDN account with your ISP. The good news is that many ISDN router vendors now provide line-provisioning services, which work

directly with your phone company to install the line. Also, most routers here feature easy-to-use wizards that greatly simplify the configuration process. To help you further, here's a breakdown of the services each router vendor offers, as well as a snapshot of ISDN account pricing among some national online services and ISPs. Some even offer auto-detection of SPIDs and switches.

Product	ISDN line provisioning	ISDN line configuration
ACC Congo Personal Router	Rapid ISDN, a national line-provisioning service, available for \$125 per node.	Includes WebWizard, a Web-based installation wizard. For \$200, ACC provides the Configuration Service Package to configure your line.
Arescom Apex 1100-3	Free national line-provisioning service included. The service will find and set up an ISP account if you don't have one.	Includes Apex Wizard for setup, which features auto-detection of SPID and switch types.
Ascend Pipeline 75	Free national line-provisioning service through CyberLink included.	Includes Java-Based Pipeline Configurator (JBPC), a GUI that lets you configure the line remotely. It features auto-detection of SPID and switch types.
Bay Networks Nautica 200	No line-provisioning service	Includes NauticaWizard, a CD-ROM installation wizard.
Cisco 766	Free national line-provisioning service through CyberLink included.	Includes Fast Step, an installation wizard featuring auto-detection of SPID and switch types. Also includes color-coded cables.
Ramp Networks WebRamp Entré	Free national line-provisioning service through CyberLink included	Includes WebRampWiz, a tutorial that eases setup. Also includes line-testing and diagnostic features.
Shiva AccessPort 2.0	RapidInstall, a national line-provisioning service, available for \$129	RapidInstall includes a free phone session with an engineer during installation. AccessPort comes with InstallWizard, featuring auto-detection of SPID and switch types. Also includes color-coded cables and a QuickTime movie.
3Com OfficeConnect ISDN LAN Modem	Free national line-provisioning service included.	Includes Web Wizard for auto-detection and configuration of the line
ZyXEL Prestige 100, 128	Telephone companies' contact information included to assist users.	No wizards included, but the Web Configurator offers a Web-based setup
National ISP or online service	Setup fee	Charges
EarthLink Network , 800-395-8425, www.earthlink.net	Personal ISDN: \$50; multiuser ISDN (includes 3Com OfficeConnect LAN Modem): \$499.95; LAN ISDN: \$149.	Personal ISDN: \$34.95 a month for 100 channel hours, \$0.99 per additional hour. Multiuser ISDN: \$49.95 a month for 120 channel hours, \$0.99 per additional hour. LAN ISDN: \$99.95 a month for 160 channel hours, \$0.89 per additional hour.
GTE Internetworking , 888-483-7873, www.gte.net	\$40	Unlimited channel hours: \$39.95 a month
IBM Internet Connection , 800-456-5056, www.ibm.net	None, but an IBM Internet account is required	\$19.95 a month plus \$3.50 per channel hour, or \$4.95 a month plus \$1 per channel hour.
MCI Internet , 800-550-0927, www.mci.com	None	\$5.95 per channel hour
The Microsoft Network , 800-373-3676, www.msn.com	None	Unlimited access: \$49.95 a month
MindSpring , 800-719-4660, www.mindspring.com	Lite plan: \$25; standard plan: \$25	Lite plan: \$6.95 for 5 hours of 64K access, \$2 per additional hour. Standard plan: \$14.95 for 20 hours of 64K access, \$1 per additional hour. Works plan: \$26.95 for unlimited 64K access. All accounts: \$1 per hour for 128K access
Netcomplete , 800-638-2661, www.netcom.com	Dedicated: 64K, \$300; 128K, \$400. Dial-up: Netcomplete 100, \$50; Netcomplete 200, \$100	Dedicated: 64K, \$150 a month; 128K, \$250 a month. Dial-up: Netcomplete 100, \$49.95 a month for 100 hours, \$0.99 per additional hour; Netcomplete 200, \$89.95 a month for 100 hours, \$0.89 per additional hour.
Sprynet , 800-777-9038, www.sprynet.com	None	Unlimited access: \$19.95 per month.

lines active, but it is marred by poor design: The switch didn't respond noticeably to touch, leaving us unsure as to whether the feature was on or off.

Congo's Web Wizard made the installation simple. Because the router includes a Web server, you can configure it through a browser. The initial setup page offers a useful ISDN tutorial, as well as photographs and diagrams of the hard-

ware and software configuration. We filled in a few blanks on the Web page and connected to our ISP within minutes.

After setup, however, a new user may find it difficult to modify settings, as some features are available only through the command line interface. For example, the Web interface won't let you change the threshold at which the B-channels begin sharing a bandwidth load.

The ACC Congo Personal Router was the only product we tested to bundle programs for integrating telephony functions. Its Java-based Phone Wizard provides a unique software-only caller ID implementation that would benefit other routers. The software also includes an address book and links to popular personal information management (PIM) software to complete the package. Altogether, the Congo is a good

Performance Leader.



Price Leader.

"In a graphics-intensive ad agency like ours, we demand outstanding image performance. That's why we buy the Optique® V Series monitors – like the V95 or V115. And the price is a great added incentive."

Performance Leader

If you're looking for high performance monitors, without the high price tag, be sure to ask for the Optique V Series. Whether you work in a large corporate environment, a small business or out of your home, these monitors deliver the sharp images, brilliant colors and advanced screen technology you need. Plus they're ideal for graphic design, creating a web page, desktop publishing and general office use. Choose from six models, ranging from 15" to 21" (various viewables), including our extraordinary 19" (18.0" viewable) Optique V95 monitor with its large screen and small footprint.

Price Leader

As the price leader, the Optique V Series monitors include fine dot and aperture pitches, high resolution and refresh rates, in addition to easy-to-use on-screen controls, anti-glare/anti-static screens and Plug & Play+. We also offer the full line of Optique Q Series monitors, many of which have won awards for offering an excellent product at an affordable price.

Leading the way in performance and price – that's what the Optique V Series is all about. Call (800) 843-6784 TODAY for additional product information; ask for agent 81218.

All business decisions should be this easy.

OPTIQUE®
OPTIMIZE YOUR VALUE™

438 Cheryl Lane, Walnut CA 91789
(800) 843-9748 • (909) 869-9216
Fax (909) 468-3770 • (909) 869-7318 (24-hour fax-on-demand)
Internet: www.optique.com

OPTIQUE MONITORS						
	V115T	V115	V95	V775	V773	V655
Size/Viewable	21"/19.7"	21"/20.0"	19"/18.0"	17"/16.0"	17"/16.0"	15"/13.8"
Dot Pitch	0.28mm*	0.26mm	0.26mm	0.26mm	0.26mm	0.28mm
Max. Resolution	1600 x 1280	1600 x 1280	1600 x 1280	1600 x 1280	1280 x 1024	1280 x 1024
Optimum Res.	1,280 x 1,024 @88Hz	1,280 x 1,024 @88Hz	1,280 x 1,024 @88Hz	1,280 x 1,024 @79Hz	1,024 x 768 @87Hz	1,024 x 768 @87Hz

* Aperture grille pitch



Optique V775
October 1997



Optique V775
July 1997



Optique V95
December 1997



Optique V775
December 1997



Optique V775
January 1998



Optique V775
October 1996

Choose 118 at www.pcmag.com/infolink

Copyright © 1998, ViewSonic Corporation. All rights reserved. Specifications subject to change without notice. Corporate names and trademarks stated herein are the property of their respective companies.

ISDN Sharing, Cheap

Think an ISDN router is out of your price range? No problem. You can create your own ISDN-sharing solution for as little as \$250 by combining an ISDN terminal adapter (TA) with a Web-caching proxy server. These products serve as intermediaries between LAN clients and the Internet. They direct all client IP traffic through a single, dynamically assigned IP address, much the way NAT does in a router. A proxy server can also cache Web pages so that multiple requests for the same page can be satisfied without reloading.

We installed an internal ISDN

www.wingate.net. Choose 513 at www.pcmag.com/infolink.)

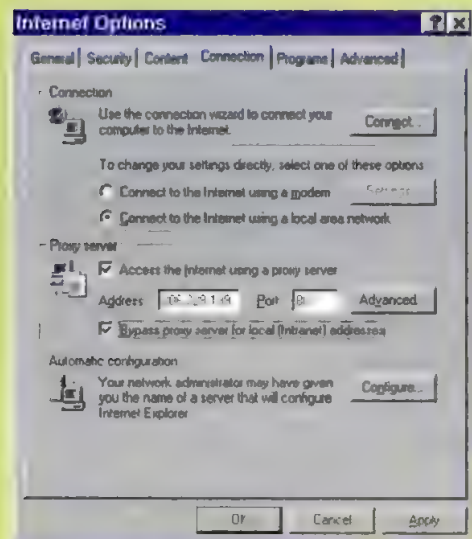
WinProxy 2.0 is substantially cheaper, at \$49.95 list for three users and \$299 for an unlimited number. Both require minimal memory and CPU power on the server, but their caches each require 50MB to 100MB of hard disk space. (Osis Software, Pleasanton, CA; 888-946-7769, 510-734-1900; www.winproxy.com. Choose 512 at www.pcmag.com/infolink.)

For an adapter, we used the Diamond Supra NetCommander ISDN (\$199.95 list), which has Windows 95 drivers that provide dial- and bandwidth-on-demand, just as the ISDN routers do. (Diamond Multimedia Systems Inc., Supra Communications Division, Vancouver, WA; 800-727-8772, 360-604-1400; www.diamondmm.com. Choose 514 at www.pcmag.com/infolink.)

Performance was comparable to an ISDN router's. And both proxy servers were easy to install, although we give a slight nod to WinProxy. Each provided excellent Web browsing and throughput, but both also required some fiddling before our e-mail would work.

When you add up the \$199.95 for the ISDN board and the \$49.95 for a three-user WinProxy license, the total is about \$250 less than for the cheapest router in our roundup. And if you decide to add a router, you can continue to use the proxy server behind the router for an added performance boost.

Despite these pluses, an ISDN router is still the superior solution. The Web-caching proxy server does not let multiple users share the line simultaneously, because of a limitation of Windows 95's Dial-Up Networking. Moreover, the host system must always be turned on to provide access to the POTS line for incoming faxes or an answering machine.—LF



WinGate's Internet Options panel lets you configure how you connect to the Internet.

TA and two popular proxy servers on a 200-MHz Pentium Compaq Presario. Deerfield.com's WinGate 2.1 and Osis Software's WinProxy 2.0 run on Windows 95 and NT and provide proxying for most popular IP protocols.

WinGate 2.1 ranges from free to \$700 (list), depending on the number of users. The free version is for two clients (including the one on the proxy server), so it's a good choice for two-user home LANs. The five-user version is \$250, and the unlimited version is \$700. (Deerfield.com, Gaylord, MI; 800-599-8856, 517-732-8856;

choice for experienced users looking for telephony extras.—Jeffrey G. Witt

ACC Congo Personal Router. List price: Tested configuration, \$645. Advanced Computer Communications, Santa Barbara, CA; 800-444-7854, 805-685-4455; www.acc.com. Choose 500 at www.pcmag.com/infolink.

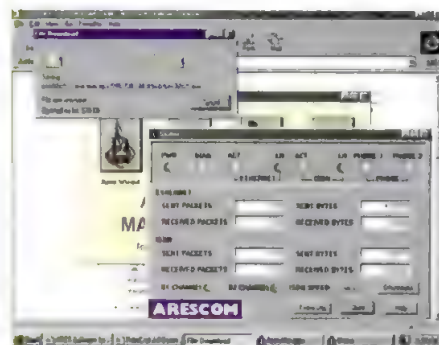
Arescom Apex 1100-3

Arescom designed the Arescom Apex 1100-3 (\$679 list, \$450 street) to be accessible to new users. Thus, the Apex Wizard configuration software and monitoring tools are extremely easy to use, and they do not sacrifice functionality or resort to the command line. Unfortunately, problems with the installation wizard and limited call-handling capability keep the Apex from fully achieving its goals.

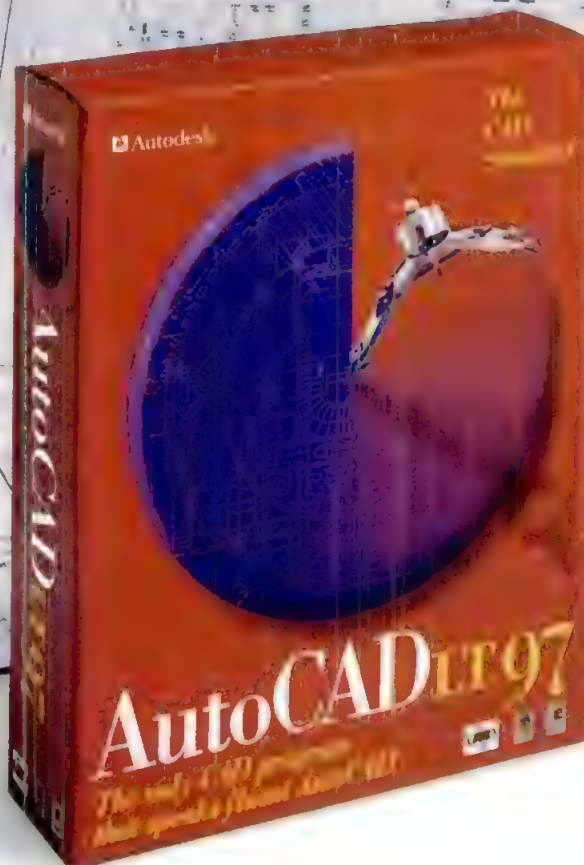
The Apex Wizard installation software requires you to provide only your ISP phone number and user identification data. When set to fully automatic mode, the wizard can quickly handle router setup with minimal user input. The wizard is backed up by a detailed user manual that covers configuration in a clear, step-by-step manner.

We liked that the installation wizard includes automatic SPID and switch detection. But during our tests, the wizard produced an error that should put new users on guard. SPID auto-detection is not always possible, but we found that when the wizard entered an incorrect SPID value, it still told the user it had detected the SPID correctly. Though the 3Com OfficeConnect suffered from a similar problem, it informed the user that it could not auto-detect the SPID.

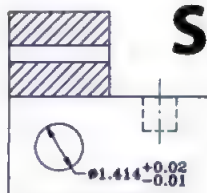
Once we got the router configured, we found the Apex's monitoring, security,



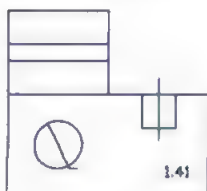
Arescom's Apex Manager Status utility displays the router's indicator lights and provides throughput statistics.



The *only* CAD program that speaks fluent AutoCAD.



Since AutoCAD® it uses the same native DWG drawing file format as AutoCAD, any drawing you read or write with AutoCAD LT is the same as with AutoCAD. Every time.



Other CAD programs modify drawings as they read and write the AutoCAD DWG file format, causing imprecise measurements, missing elements, changed text and incorrect line types.



AutoCAD® is the universal language of design — the world CAD leader. And there's only one CAD program that's truly compatible: AutoCAD® LT 97. Now AutoCAD LT 97 is compatible with other leading standards, including Microsoft® Office 97.

The Essence of AutoCAD.

Perfect for designers or projects that do not require full-blown AutoCAD capabilities, AutoCAD LT 97 works as a drafting tool for preliminary sketches, detail drawings or final designs. And now it's even easier. In addition to complete Internet tools, our new Content Explorer™ allows you to drag and drop existing blocks and drawings.

Best of all, AutoCAD LT 97 lets you share files, worry-free, with more than 2 million AutoCAD and AutoCAD LT users worldwide — from colleagues to clients to contractors.

100% Full R14 Compatibility.

AutoCAD LT 97 is compatible with every version of AutoCAD, including R14. Other CAD programs claim to read and write AutoCAD's native DWG drawing file format. And that can be risky because you could end up with drawing errors. Since AutoCAD and AutoCAD LT 97 use the same DWG file format, you can share files easily — without errors. No lost line types, changed dimensions or jumbled fonts. No long waits for loading or saving. And, most importantly, no miscommunication of ideas.

AutoCAD LT 97 is available for an ESP of \$489 at software retailers and authorized Autodesk dealers. Call 1-800-225-1076 and ask for DemoPak A576 or visit us on the Web at www.autodesk.com/a576. Then get ready to speak the universal language of design. Fluently.

See your local software reseller or call 1-800-225-1076 for upgrade information or DemoPak A576.

 Autodesk.

DESIGN
YOUR
WORLD

It's cutting edge...

It's interactive...

It's PC Magazine Extra...

**and every PC Magazine reader
should have it!**



Now there's an interactive CD-ROM companion to *PC Magazine* that gives you information you can't get through print alone. Using advanced multimedia technology, it lets you actually sample programs and products...see screens...examine

printout...hear playback...and listen in as the gurus of the industry discuss new technology.

It's **PC Magazine Extra**, and it's guaranteed to help you know more, and do more, with new PC products and technologies.

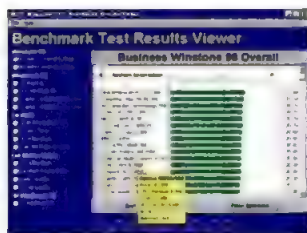
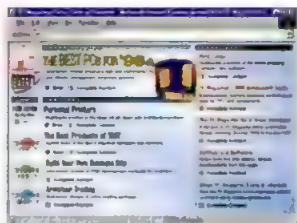
You get the complete text of the past year's issues of PC Magazine!

Want to check out past reviews? Catch up on a topic you missed? *PC Magazine Extra* gives you a searchable reference library of the past 12 months of *PC Magazine* with every quarterly release. With the hit of a key, the click of a screen, all the valuable buying advice and productivity help from *PC Magazine* will appear on your desktop.

Subscribe to *PC Magazine Extra*, and by the end of one year you'll have two years' worth of back issues on disc — \$173.80 worth of *PC Magazine* — yours to access instantly. And your CDs won't take up so much as one inch on your bookshelf!

Put your system to the test — with PC Magazine's Benchmark Tests!

Are you running at top speed? Is it time to upgrade? Now you can rate your own equipment with many of the same WinBench and Winstone tests our experts use. Every edition of *PC Magazine Extra* lets you access many of the best benchmark tests — without waiting for a trade show release, without the tedious downloads.



Get the edge in product purchasing and productivity! Guaranteed!

In past releases we've let you see and hear samples of the top 100 CDs, watch full-motion videos of the fastest Pentium dynamos, given you trial versions of new Windows software to try before you buy...and linked you straight to the coolest sites on the Net.



PC Magazine Extra — it's the perfect addition to your knowledge base. Get it and you'll know more. You'll do more. You'll buy smarter. Or we'll give you your money back. Guaranteed!

Act now to save 30%!

Sign on for *PC Magazine Extra* with this ad and you'll get 4 quarterly releases for \$49.95 — 30% off the price you'd pay at the newsstand. That's like getting nearly two of the discs free — and that's a great deal on a product that brings you the sight and sound of the programs, products and people you want to get to know.

Call 1-800-335-1195 now and mention priority code: 5Z8E7.

Use your MasterCard or Visa and mention the priority code to start your one-year (4-release) subscription at this insider price! Or, visit our special order page at:

<http://subscribe.pcmagextra.com/deals>.

Do it now.



Toll-free number is available in the U.S. and Canada. Other countries, call 303-665-8930, or fax your order to 303-604-7455.

**Get 4 Quarterly Releases
For \$49.95 — Save 30%
Call 1-800-335-1195
(Mention Priority Code: 5N6F)**



PC MAGAZINE EXTRA • P.O. Box 59494 • Boulder, CO 80322-9494

SYSTEM REQUIREMENTS: 486 SX-based PC or better, 8MB RAM, 6MB hard disk space (optional components require additional space), MS-DOS and Windows 95*, 256-color VGA display, double-speed CD-ROM drive, 16-bit audio. Please allow 60 days for delivery. Send payment in U.S. funds only. PC Magazine Extra is \$72 in Canada; \$99 for all other foreign orders (includes airmail charges).

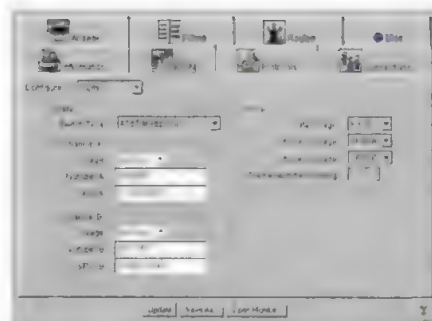
and troubleshooting tools complete and easy to use. They let you set preferred operational settings, such as connection and line time limits, and a status screen replicates the router's indicator LEDs. The screen even displays speed indicators for the individual B-channels, in addition to showing packet and byte counters.

Call handling needs to be improved. While both channels were busy serving two PCs with large downloads, the Apex correctly switched both users to one B-channel so that an outgoing call could use the other B-channel. But when the router received an incoming call under the same conditions, the result was a busy signal—a problem if you want to use the line to receive faxes or calls on demand. Arescom states that a configuration option for automatic incoming-call sup-

port is in development, but the company provided no time frame. If Arescom continues to improve the Apex, it could become an excellent router that will be a good match for new users.—**Bruce Brown**
Arescom Apex 1100-3. List price: Tested configuration, \$679 (\$150 rebate until May 31, 1998). Arescom Inc., Fremont, CA; 888-575-4736, 510-445-3638; www.arescom.com. Choose 502 at www.pcmag.com/infolink.

Ascend Pipeline 75

Ascend Communications has a reputation for taking the high road with its products, and its personal ISDN router is no exception. At \$995 list (\$640 street), the Ascend Pipeline 75 is the highest-priced product in our roundup, but Ascend backs up the price by packing the Pipeline full of high-



Ascend's new Java-Based Pipeline Configurator (JBPC) puts a friendly face on the Pipeline 75's complex configuration options.

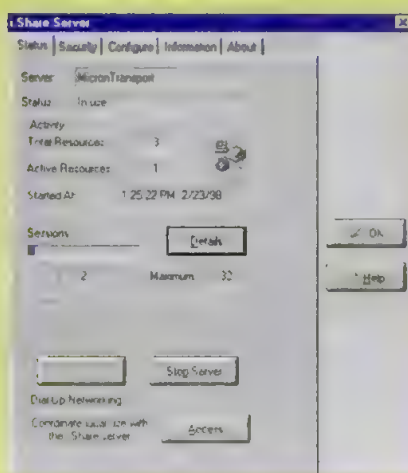
end features geared primarily to small branch offices of large companies. The Pipeline's full-featured IP and IPX routing and remote-access capabilities, as well as an optional Secure Access firewall and Frame Relay capability, make it an excel-

ISDN Sharing, Software-Style

Small offices on tight budgets looking to squeeze the most out of their LAN hardware might want to consider ISDN-sharing software instead of a router. Such software resides on a server and uses one TCP/IP stack and IP address to connect your LAN clients to your ISP account. (It also lets you share a modem.) But keep in mind that because such a program is located on a nondedicated server, its use will affect the performance of your other server-based programs, especially during periods of heavy Internet use.

Artisoft's **i.Share 2.5** (3 users, \$99 list; 32 users, \$249) is simple to install. One CD-ROM conveniently provides the server and client versions and online documentation. And unlike Virtual Motion's Internet LanBridge, i.Share lets you install multiple line-sharing servers on the same network. We appreciated the load-balancing feature, which lets the client software find and use the least busy connection. Also useful is i.Share's ability to reestablish a dropped connection automatically.

The i.Watch screen lets an administrator enable or restrict access to specific Web addresses. The password-protection option is useful for home



The Status tab displays the number of current and available Internet sessions.

offices and small businesses alike.

The package also comes with an evaluation version of Artisoft's Internet mail server XtraMail, NetCentric's Internet faxing software FaxStorm, and Qualcomm's e-mail client Eudora Light. (Requires: For server, Microsoft Windows 95 or NT 4.0 with a patch from Microsoft's Web site; for client, Microsoft Windows 3.x, 95, or NT 4.0. Artisoft Inc., Tucson, AZ; 800-846-9726, 520-670-7100; www.artisoft.com. Choose 510 at www.pcmag.com/infolink.)

Like i.Share, Virtual Motion's **Internet LanBridge 1.35** (three users, \$149 list; unlimited users, \$295) is designed for the small office. Installation off the included floppy disks is simple—particularly on the client side, which requires simply identifying the host server. Server-side installation isn't much more difficult. It requires you to enter your ISP account information and DNS and server IP address.

When you request an Internet session, a pop-up screen tells you that LanBridge is connecting with your ISP. Although it doesn't include i.Share's wide software selection, LanBridge's superior administrative tools make it a better fit for the small corporate setting. In addition to controlling access to specific sites and services, you can control who has Internet access, how long to maintain an idle connection, and how much connection time to allow. A status program that runs on the server can show both the current connections and the applications usage. (Requires: Microsoft Windows 95 or NT 3.51 or later. Virtual Motion, San Francisco; 415-778-0100; www.virtualmotion.com. Choose 511 at www.pcmag.com/infolink.)—BB

Solutions³



NICs On Board

With a factory-installed 3Com NIC, our partners' systems get you onto the network – fast.

Out of the
box
onto the
Network

By purchasing desktop systems, notebooks or servers with 3Com Network Interface Cards (NICs), PC Cards or modems pre-configured and pre-installed, you'll be saving time and configuration hassles.

As the world's networking leader with over 100 million network connections, 3Com has set the pace in network solutions. Now we're partnering with leading computer manufacturers, resellers and distributors to bring you 3Com Network Ready™ systems equipped with the finest NICs, PC Cards and modems available. These systems are pre-configured, stringently tested and certified for complete compatibility with current network environments. And with Parallel Tasking® performance, DynamicAccess™ software, TranscendWare™ network management and x2™ technology, 3Com interface products offer the highest performing options on the market today.



For a complete list of 3Com Network Ready Partners, call us at 1-888-906-3COM, ext. 105 or visit our website at www.3com.com/networkreadypad2. Get onto the network faster by buying a system with a 3Com card inside.

Ask for 3Com Network Ready systems today.

©1997 3Com Corporation. All rights reserved. 3Com and Parallel Tasking are registered trademarks and 3Com Network Ready, the 3Com Network Ready logo, DynamicAccess, TranscendWare and x2 are trademarks of 3Com Corporation and its subsidiaries.



PERFORMANCE TESTS

Personal ISDN Routers



The routers in this roundup all delivered similar throughput, within 6 percent of one another. A more interesting issue is that we all talk about ISDN in terms of 128 Kbps, but our tests showed that real throughput is slower.

What the Numbers Mean

To test raw throughput, we downloaded a single noncompressible 130K file from a Web site over an ISDN line. We used a noncompressible file as this is the type of file typically downloaded from the Web. Compression comes into play in some circumstances, but most files users download have already been compressed at the site.

To test how the routers allocate bandwidth between the two B-channels, we downloaded the same file to two systems simultaneously. The FTP (File Transfer Protocol) Copy test showed that all the routers split the data flow to about a 60/40 ratio between the two clients. Our testing also demonstrated that the routers implement MultiLink PPP (MP) well, each providing a single client with over 100 Kbps of bandwidth, on the average.

On our tests, we had the ISDN routers call a server connected to a Cisco router. This setup caused a hitch with the Ascend Pipeline 75,

Bold type denotes first place
Kilobits per second

ACC Congo Personal Router

AreaCom Apex 1100-3

Ascend Pipeline 75*

Bay Networks Nautica 200

Cisco 766

Ramp Networks WebRamp Entré

Shiva AccessPort 2.0

3Com OfficeConnect ISDN LAN Modem

ZyXEL Prestige 100

ZyXEL Prestige 128

* Connected to an Ascend router.

FTP Copy

First client

Second client

Combined

61.0

56.1

60.7

58.6

61.6

58.6

59.1

55.6

51.0

59.0

58.4

63.4

56.9

61.3

61.0

60.8

58.3

61.9

60.7

60.0

119.5

119.4

117.5

120.0

122.6

119.4

115.4

117.4

119.7

118.9

BETTER ►

www.pcmag.com

Go to PC Magazine Online

to access these test

results with our

exclusive, interactive

benchmark test viewer.

which expects either to make a connection with an Ascend router or to use an ISDN line that deploys *line rollover*, a technique that moves new incoming traffic to an inactive line. Because our lines weren't configured for line rollover, we set up a special test-bed for the Pipeline 75 that connected

to an Ascend router. With this setup, the Pipeline 75 performed comparably to the other products. (Its original scores, using the Cisco router, were 32.3 for the first client and 31.0 for the second.)

Though any one of these ISDN routers will provide throughput speeds from 110 to 120 Kbps, the actual speed at which you download files depends on their size and number. When you download a file, the network devices interact by opening and closing TCP connections, each instance of which adds a layer of overhead to your connection. Also contributing to overhead is the router's translation of the registered IP address to a client's NAT address. We found that downloading one large file allows the router to sustain a higher throughput than downloading several small ones.

How We Tested

Our test-bed included two HP Vectra clients, each with a 150-MHz Pentium MMX processor and 32MB of RAM and running Windows 95. For routers that didn't include a built-in hub, we attached a 10-Mbps Asanté hub. Our test server was a Dell PowerEdge 2200 with 233-MHz Pentium II processors and 128MB of RAM.

—Analysis written by Kristina DeNike

lent choice. Moreover, an easy installation and intuitive GUI make the Pipeline approachable to beginners interested in the additional features.

The Pipeline's rear panel has an ISDN jack, two POTS jacks, an RS-232 port to connect to your configuring PC, and both 10Base-T and AUI Ethernet connectors. The front panel has five LEDs that indicate power-on, ISDN connection, and activity. Like the Cisco 766, the Pipeline's gray plastic case includes two slots that let you mount the router on a wall. Ascend's excellent documentation includes three

thick, detailed manuals. In case you prefer your documentation on-screen, a CD-ROM is also included.

Ascend's new software Java-Based Pipeline Configurator (JBPC) contributed to an exceptionally easy installation. We simply connected the cables and inserted the installation CD into a LAN client. The installation program copied the configuration software, and the configuration software then automatically located the router on the LAN. Unless you are using the Pipeline to connect to a central-office network, all you need is

your own ISDN phone number, your ISP's phone number, and your account user information. We had our test unit up and running in less than 10 minutes.

As with earlier models, Ascend continues to provide a powerful text-only command line interface and real-time status reports. But with the Pipeline 75, Ascend introduces a real-time Monitor program. Experienced users may feel right at home with the command line interface, but Monitor gives new users the same capabilities wrapped in an easy-to-use GUI. You can access all of the

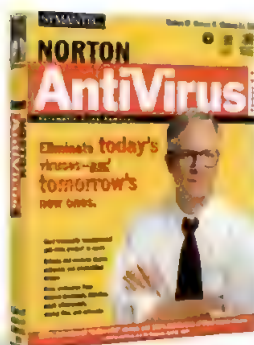
You May Get Only One Chance to DO THE JOB RIGHT

Norton AntiVirus™ 4.0

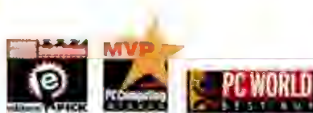
When a virus hits your computer, you may get only one chance to stop it. That's why you need Norton AntiVirus — *PC Magazine* Editor's Choice winner three years in a row and the world's #1 anti-virus software.

The likelihood of getting a virus is 20 times greater than it was just two years ago. But Norton AntiVirus makes it easy to protect yourself — with virus detection and 100% disinfection of macro viruses. You can share floppies, surf the Internet, and download networked files with confidence. You stay productive because your work is safe.

Plus, Norton AntiVirus also protects you against viruses being developed right this minute. The experts at the Symantec AntiVirus Research Center (SARC)™ work around-the-clock to bring you the latest virus definitions that keep your computer healthy.



So if you want the absolute best protection against viruses, get Norton AntiVirus. Get it today and **receive a \$10 rebate.*** To download a free trial version or for more information, visit www.symantec.com. It's a jungle out there. Play it safe.



"The best combination of virus protection, performance and usability."
—*PC Magazine*, March 24, 1998

SYMANTEC.™

*Offer expires June 30, 1998. Valid through mail-in rebate only. See your store for terms and conditions. Symantec, the Symantec logo, and Norton AntiVirus are registered trademarks and SARC is a trademark of Symantec Corporation. All other brand names and trademarks are the property of their respective owners. © 1998 Symantec Corporation. All rights reserved.

Alternative Technologies for Fast Connections

ISDN may be the most widely available high-speed Internet access service available today, but new and exciting technologies are emerging and could start gaining ground.

Cable modems, Direct Broadcast Satellite (DBS), xDSL, and multichannel multipoint distribution services (MMDS) feature fast download rates that can rival or even exceed the 1.544 Mbps achieved by leased T1 lines. With the V.90 standard on its way to approval, even 56-Kbps analog modems offer a greater challenge to ISDN, particularly with a new capability that lets you aggregate pairs of 56K modems to achieve download rates of 112 Kbps.

Still, many of these approaches are still in early development or have begun a slow ramping up of the required infrastructures, leaving potential users with few real choices right now beyond ISDN and 56K. Whether any of the faster products are available to you depends primarily on where you live and the types of services your local telephone and cable television companies support. —BB

xDSL

DSL (digital subscriber line) technology is a hot concept that is gaining a lot of attention, because of its potential to deliver fast Internet connections using conventional copper wiring with direct connections between customer locations and the local Regional Bell Operating Company (RBOC) local offices. There are



several DSL variations, each identified by an initial letter: high-bit-rate DSL (HDSL), symmetric or single-line high-bit-rate DSL (SDSL), very high-bit-rate DSL (VDSL), dedicated ISDN DSL (IDSL), and asymmetric DSL (ADSL). xDSL's ability to use existing copper wire means its use could grow rapidly, although proliferation of standards can't be relied upon as an indicator of rapid, widespread customer adoption.

xDSL isn't available in many areas and is relatively expensive where it is available. UUnet currently offers 128-Kbps IDSL in parts of California for a start-up fee of \$3,500 and monthly charges varying from \$800 to \$1,000, depending on the Internet usage term.

A high-profile alliance backs ADSL, including Compaq, Intel, and Microsoft (CIM) and the Universal ADSL Working Group (UAWG), which is made up of RBOCs and networking companies. The ADSL standard calls for downloading at 1.5 Mbps, but uploads are much slower, ranging from 16 Kbps to 640 Kbps and averaging around 512 Kbps.

InterAccess in Chicago was the first company in the U.S. to offer ADSL service. It currently charges \$650 for a modem, which plugs into an Ethernet adapter or hub, a \$200 installation fee, and \$150 to \$170 monthly. Regional telephone companies are pressing for widespread adoption of ADSL and for significantly lower prices to let them compete with the cable television industry, which is ramping up its digital-fiber wire infrastructure as quickly as possible. Once ADSL is more widely available, monthly costs are expected to range from \$40 to \$60 a month with a modem included, as is the case with today's cable modems.

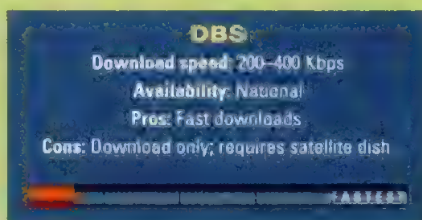
One major drawback of DSL service is that subscribers must live within proximity of a phone-switching station. Prices go up and performance drops off significantly beyond 3.5 kilometers of the nearest station. This limitation makes DSL technology a less practical option for rural customers.

Direct Broadcast Satellite

DBS service broadcasts data to reception dishes. It doesn't rely on telephone or television wiring infrastructure, and all it takes is a 18- or 21-inch satellite dish and a provider service contract. Because digital satellite systems are highly reliable, they need fewer signal checks than analog lines, helping DBS systems reach download rates of up to 400 Kbps. The actual DBS broadcast rate is 12 Mbps, but service providers such as Hughes Network Systems' DirecPC quote peak rates of 200 to 400 Kbps. A downside to DBS is that you need an analog modem and telephone line to send data.

The best news about DBS is that it is now available on a nationwide basis, assuming you can mount the required 21-inch elliptical satellite dish with a clear line of sight to the south.

The one-time cost of DBS can be under \$500, without installation. Hughes currently charges \$299 for the DirecPC Personal Edition, plus a \$49.95 activation fee. Monthly service rates include \$19.95 for unlimited off-peak 200-Kbps service, \$39.95 for off-peak 400-Kbps service, \$79.95 for unlimited peak-hour 200-Kbps service, and \$129.95 for peak-hours 400-Kbps plans.



Since DBS requires conventional modems for access and uploading, it isn't suitable for users who need to transmit huge amounts of data. And because of physical impediments to satellite dish positioning, many potential users will find DBS impossible or impractical. For those who have a clear view to the south and who care only about download speeds DBS is a fine choice that is available now.

Pipeline's features and settings through Monitor and JBPC, something you can't do with the Prestige models. Once again, Ascend delivers one of the leading products in this market. —Les Freed

Ascend Pipeline 75. List price: Tested configuration, \$995. Ascend Communications Inc., Alameda, CA; 800-272-3634, 510-769-6001; www.ascend.com. Choose 503 at www.pcmag.com/infolink.

Bay Networks Nautica 200

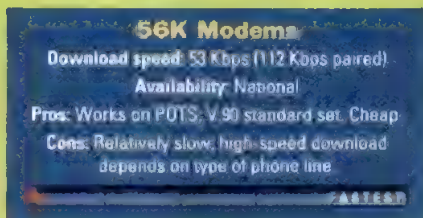
With the Nautica 200 (\$595 list, \$390 to \$540 street), Bay Networks packs a fine feature set into a small box. A limited GUI forces you to use the command line to perform some tasks, which ultimately makes the Nautica less than ideal for first-time router users. But it's a good bet for experienced users looking for a value.

The Nautica is a tiny box, about 1.5 inches high and 5 inches square. Such a size leaves little elbow room for status LEDs. Nautica's single LED switches colors and flashes in various patterns to indicate error and operational conditions, and you must keep the manual close by to decipher the patterns' meanings. Fortunately, the Nautica alleviates this limitation somewhat with NauticaWatch, a real-time status and per-

56K Modems: Singles or Pairs

Available for some time now, the 56K modem is the most common type of fast Internet connection that uses conventional analog technology and POTS. Although there were two competing proprietary standards, the ITU released its V.90 standard in February, but the standard won't receive final approval until this September. Vendors can, however, begin developing compliant products while waiting for the finalized standard.

Current FCC regulations limit 56K modems' download speed to 53 Kbps, so the name is misleading. And 53 Kbps is the maximum download rate the modems can attain. Even 53 Kbps is possible only if there is just one switch



between the user's PC and the phone company. More than one switch drops the transfer rate down to 33.6 Kbps, the maximum upload speed.

Aggregating (bonding) pairs of 56K modems is a new concept that employs two modem chips, two analog lines, and two connections to an ISP, for a maximum download rate of 112 Kbps and a maximum upload rate of 67 Kbps. Though several major modem manufactur-

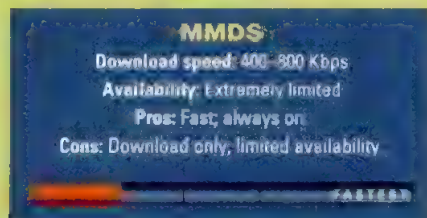
ers have announced products, we were unable to test any by press time. Not surprisingly, we found no ISPs that supported bonded modems at press time. And as ISDN rates become more competitive, the monthly cost of bonded 56K modems may be more expensive than ISDN in some parts of the country.

MMDS

Multichannel Multipoint Distribution Service (MMDS) uses microwaves at the 26- or 27-GHz frequency for high-speed data download transmission, with speeds up to 800 Kbps. The system uses a transmitter and multiple line-of-sight repeaters to send microwave signals to a small antenna at a subscriber's site. An asymmetric technology, MMDS uses an analog modem for uploading.

CAI Wireless Internet currently serves customers within 35-mile radii of its transmitters, which service the Boston, Manhattan, Rochester, and Washington, DC areas. CAI currently charges \$99 for installation (including a modem, cabling, and an antenna), plus \$49.95 per month. The host needs an Ethernet port and a conventional analog modem. You don't need a separate ISP account, and MMDS is always on. You do, however, have to pay for the analog phone line and calls to the service.

With limited availability and download service only, MMDS isn't ideal for casual Internet users; but for heavy downloading, MMDS is a bargain compared to current DSL rates.



Cable modems use coaxial cable to transmit data. Cable modem service is unavailable in most of the country, but in areas where it is supported, this extremely speedy wired service is catching on. Cable modem service is symmetrical, which means it transmits data at equal speeds to and from the Internet.

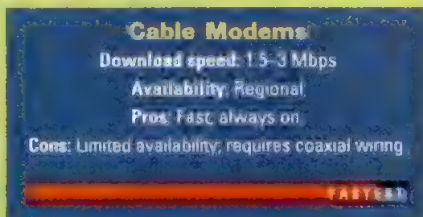
Cable modem systems use local cable television providers' lines. Since the use of cable lines for data requires a digital system, only locations with fiber-optic digital-wire infrastructures in place can offer cable modem service. @Home—one of the largest cable modem service providers—is (or soon will be) available for customers of Cablevision Systems, Cox, Comcast, Intermedia, Marcus, Rogers, Shaw, and TCI, in selected areas. Broadcast giant MediaOne also offers similar service.

When you install cable modem service, technicians must check whether your existing cable wiring meets data standards. They install an Ethernet adapter in your computer, and a cable modem is attached to the card and to the cable service via coaxial cable. Upon installation, the PC becomes part of a network with a fixed IP address. It is vital that file sharing be turned off on the PC attached to the cable modem or that shared disks become password-protected, to prevent potential intrusion from hackers.

Although cable modems are designed to reach a maximum speed of 10 Mbps, the effective maximum rate is generally 1.5 Mbps to 3 Mbps. A great concern is that effective bandwidth shrinks when cable modem service is used by a large number of people in a service area. The cable systems' answer is that scalable design will allow expansion when needed and local server caching will speed downloads.

Currently, cable modem installation costs from \$100 to \$175, and unlimited-access monthly subscription fees are \$35 to \$50, depending on the area. Cable modem service is competitive with conventional modems using analog lines, since monthly subscription fees for cable modem service are equal to or less than the monthly costs of a typical ISP and a standard analog phone line (if you have a second full line for data). Another advantage to cable modem access is that, like television channels, cable modem Internet access is always on, and thus there is no connection delay.

Cable modem service is blazingly fast and is being offered at a competitive price for active users. But because of the need to install digital cabling infrastructure and its heavy cost, the widespread adoption of cable modem service will be relatively gradual.



formance-monitoring program. Nautica-Watch displays ISDN traffic bar graphs and timed ISDN usage information in an attractive single-pane user interface.

The Nautica's printed documentation is limited; a more detailed version is available on an included CD-ROM. But each time we inserted the CD-ROM, it automatically launched the software installer.

The router provides a quick and easy

wizard-based installation. The Nautica Wizard auto-installs from the CD-ROM, prompts you for information, then configures the router. Unlike many of the other wizards in the units we tested, though, the Nautica Wizard doesn't automatically determine your ISDN switch type or SPID information. Bay Networks plans to include this feature in a future release.

Once you've performed the initial con-

figuration, you can use the wizard's menu to check and change most—but not all—of the configuration settings. To access some settings, such as the unit's ISDN information and IP address, you must rely on the command line interface.

As with most of the routers, when you need to move your ISDN line because of a change in office locale or area code, you must use a text editor such as Notepad to

What's Nextranet?

Who knows?

But for insights and information
on the infrastructure products that
are making networks, intranets,
extranets, and the Internet work
today – look to Net Tools.
It's a special new section in every
issue of PC Magazine designed
to keep networking buyers like
you right on the edge.

The Benchmark



**Net
Tools**

www.pcmag.com

Corel's Publishing Solution Meets the Highest Standards—Yours!



As a professional desktop publisher, you're proud of your ability to perform under pressure. You deliver creative, appealing designs—and you always meet your deadlines. You're reliable and flexible. You're also up on the latest technology, publishing to paper and the Web.

Now there's a product that meets the same high standards you set for yourself—Corel VENTURA™ 8. Power and ease of use deliver amazing performance. Advanced capabilities for text and graphics offer complete creative freedom. And state-of-the-art Internet enhancements let you send a document to the printer or the Web with the click of a button.

Powerful Publishing. Professional Results.



Includes:

- Corel VENTURA™ 8
- Corel PHOTO-PAINT™ 8
- Corel® WordPerfect® 8
- Corel® DataBase Publisher

\$199 Upgrade*

KJR-0558-US

This advertisement was designed and created using award-winning Corel graphics software.



MicroWAREHOUSE
1-800-558-4366
Please use source code PCM 2596

PC Connection®
1-800-800-4397
Please use source code V9999



1-800-258-2088

TigerDirect
Call toll free!
1-800-CD-TIGER
1-800-238-4437

*US\$ plus applicable taxes and shipping. Dealer may sell for less. Prices may vary from store to store. Available to registered users of VENTURA, Corel VENTURA™, Corel® WordPerfect®, CorelDRAW™ and users of selected competitive products.

Copyright © 1998 Corel Corporation. All rights reserved. Corel, Go further, Corel VENTURA, CorelDRAW, Corel PHOTO-PAINT and WordPerfect are trademarks or registered trademarks of Corel Corporation or Corel Corporation Limited. Microsoft and Windows are registered trademarks of Microsoft Corporation. MMX, the MMX logo and Pentium are trademarks or registered trademarks of Intel Corporation. All other product, firm and company names and logos are trademarks or registered trademarks of their respective companies.

Choose 332 at www.pcmag.com/infolink



Go further™
www.corel.com

edit the configuration file manually. Each time we tried to upload a modified configuration file, though, we were met with frustrating General Protection Fault (GPF) errors. But all in all, the Nautica has a lot to offer the experienced user.—*LF*

Nautica 200. List price: Tested configuration, \$595. Bay Networks Inc., Santa Clara, CA; 800-622-9638, 408-988-2400; www.baynetworks.com. Choose 504 at www.pcmag.com/infolink.

Cisco 766

Any Cisco entry into the personal-router market has the feel of an enormous router presence being squeezed into a small box.

A wizard-based installation makes the Cisco 766 (\$799 list) much easier to set up and configure than previous models, though it retains its impressive feature set. The 766 demonstrated a few installation quirks and relies on a command line interface for many tasks, but these drawbacks are offset by excellent built-in reference tools and thorough documentation. We found that the 766 is an acceptable choice for new users willing to learn the command line interface.

True to its name, the 766's FastStep wizard provides a quick and easy installation featuring step-by-step setup. Uniquely, Fast Step pauses at various stages to test both the ISDN lines and your ISP connection. The software worked well on one of our test lines, but it consistently failed to determine the proper central-office switch type and SPIDs for our second line. When we entered the correct switch type and SPID information manually, the wizard insisted that the SPIDs were incorrect. Interestingly, the router worked well with the configuration FastStep created, although the wizard failed to complete its diagnostic tests.

For remote administration, the 766 has a Web-based interface called ClickStart. It connects to a simple Web server built into the router. ClickStart isn't as complete as FastStep, but it lets you install and configure most aspects of the router by filling out a form via browser.

The 766 has 14 LEDs, more than any other product we tested. They provide detailed status information about the LAN connection, ISDN B-channels, and phone ports. The rear panel includes a duplicate

ISDN-status LED, along with color-coded ISDN, phone, and Ethernet connectors. We especially liked the 766's cables, which are color-coded to the rear-panel connectors, making setup easy. The 766 is one of only a few units we tested that include an on/off switch as well as a hub/NIC switch, so you can connect the 766 to an Ethernet hub or PC without a crossover cable. And the 766 is the only unit that provides an ISDN ST output jack for connecting an ISDN telephone or a Group IV ISDN fax machine, a boon for anyone who plans to use high-speed fax equipment.



Although Cisco claims you need to use the command line interface only for remote administration tasks, we found that you must perform some local administration from it as well, including any configuration changes that you need to make after the initial installation, for example. The interface provides access to the 766's detailed command structure, but it takes some time to learn. Fortunately, the router has a built-in command reference, so you don't have to memorize the 766's extensive command list. In case you need more detail than the help system offers, Cisco provides excellent reference documentation in hard copy and on CD-ROM. Experienced users comfortable working in the command line will best appreciate the Cisco 766.—*LF*

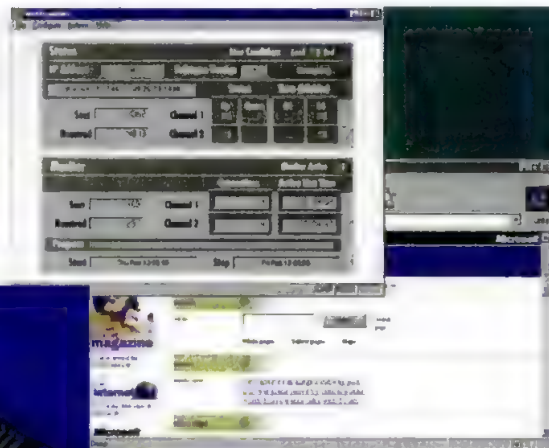
Cisco 766. List price: Tested configuration, \$799. Cisco Systems Inc., San Jose, CA; 800-553-6387, 408-526-4000; fax, 408-526-4100; www.cisco.com. Choose 505 at www.pcmag.com/infolink.

Ramp Networks WebRamp Entré

An excellent installation procedure, rich monitoring utilities, and comprehensive hardware features make the Ramp Networks WebRamp Entré (\$849 list, \$750

street) an excellent pick for the home and small office—for new users and experts alike. The WebRamp comes with an integrated four-port Ethernet hub for connecting multiple PCs, an extra also included with the 3Com OfficeConnect.

The WebRamp includes a quick-start



The WebRamp features one of the more stylish exterior designs, and its Wiz software provides excellent monitoring tools.

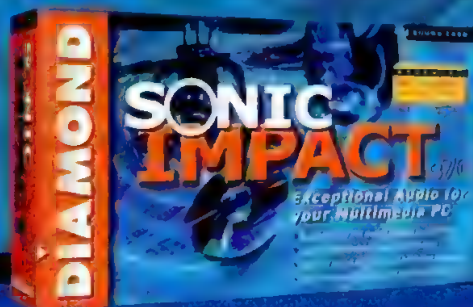
guide and cables for ISDN and network connections. Clearly labeled ports make setup straightforward, and diagnostic LEDs alert you if something is attached incorrectly—a nice safety valve for the inexperienced user.

Thanks to the WebRampWiz software, our installation went without a hitch, although the lack of SPID and switch detection makes the process a bit more difficult for the uninitiated user. The GUI-based software prompts you for each ISDN and TCP/IP configuration setting. To be clear on how to answer questions for each setup parameter, you can fax handy worksheets to your ISP and ISDN provider, which fill out the appropriate information for you.

The WebRamp features one of the more stylish exterior designs—curved and topped with easy-to-understand LEDs. The diagnostics, power, B-channels, and Ethernet port status LEDs are clearly marked and spaced well apart. In case you want to connect to an existing hub or plan later expansion, you use the first Ethernet port by merely flipping the uplink switch, which dispels the need for confusing crossover cables.

The WebRamp software extends beyond the initial installation guidance. Unlike other products that give you good wiz-

THAT STEADY, RHYTHMIC POUNDOING YOU HEAR IS OUR SOUND CARD BEATING THE COMPETITION



Introducing **Sonic Impact**. Advanced PCI Audio Made Affordable.

SONIC IMPACT BLASTS THE COMPETITION.

	DIAMOND SONIC IMPACT	CREATIVE SOUNDBLASTER AWE64 GOLD	ENSONIQ AUDIO PCI
NUMBER OF DIRECTSOUND STREAMS SUPPORTED IN HARDWARE*	32 STREAMS	0 STREAMS	0 STREAMS
NUMBER OF DIRECTSOUND 3D STREAMS SUPPORTED IN HARDWARE**	6 STREAMS	0 STREAMS	0 STREAMS
DATA THROUGHPUT RATE	100MB/SEC	8MB/SEC	100MB/SEC
HARDWARE WAVETABLE VOICES	64	32	0

* Each CD-quality DirectSound stream carries an orchestra of sounds simultaneously. With Sonic Impact, all 32 streams are processed on-board, unlike other sound cards that rely heavily on the CPU. Number of streams tested with DSShow 3D.

** Each DirectSound 3D stream can be positioned independently around your head creating a sense of wrap-around realism that greatly enhances your multimedia experience.

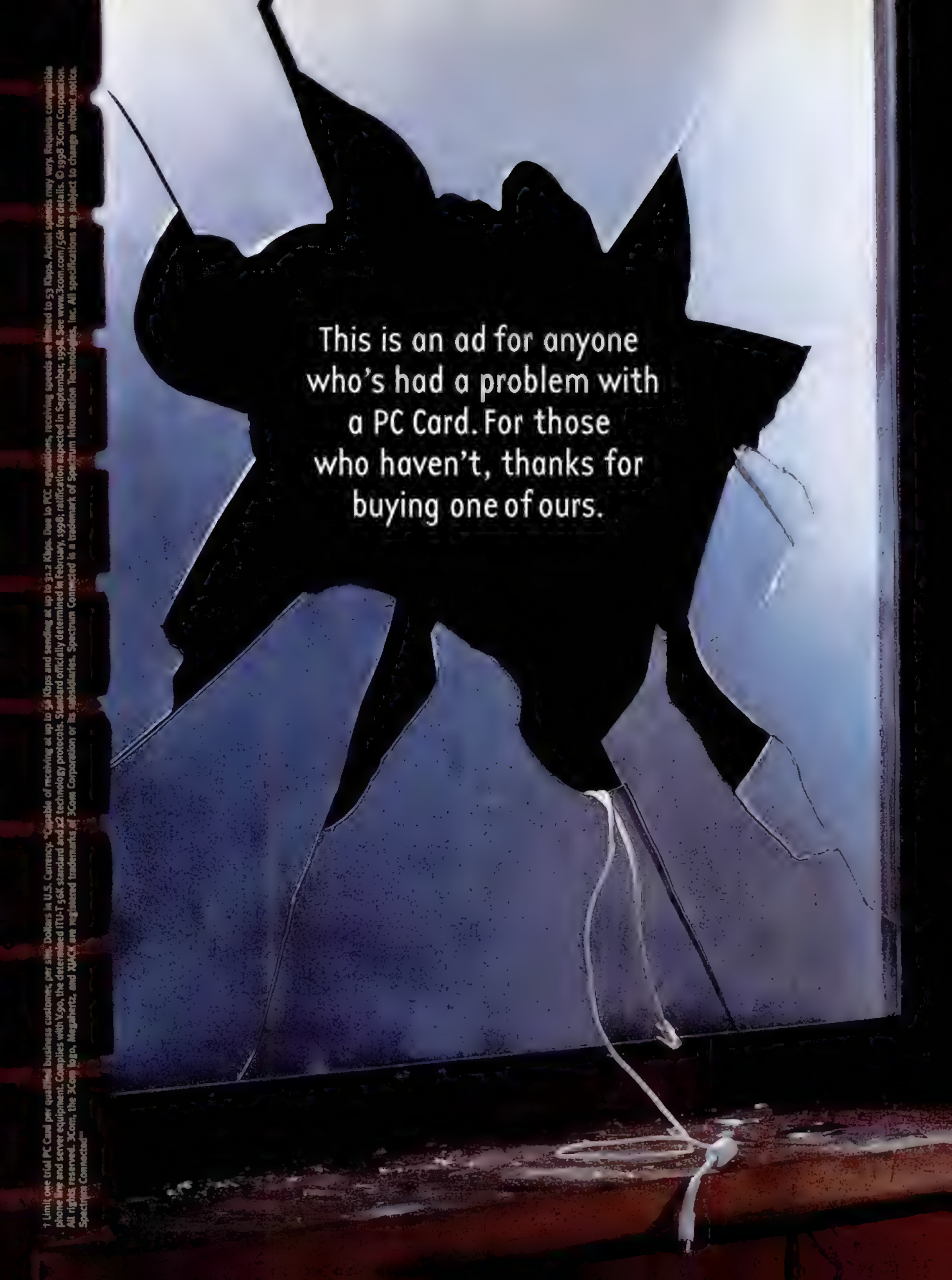


RECEIVED
7 NOV 1998

Listen up! Diamond Multimedia's new Sonic Impact PCI audio card is the best performance value in PC audio today. Diamond's PCI sound cards bring advanced audio to the PC, replacing the older, sluggish, ISA-based sound cards. Sonic Impact takes advantage of the newest audio features, shattering the ISA bus bottleneck for true high-fidelity sound and more powerful PC performance. Plus, it's easy to install. Our unbeatable 64-voice DLS (downloadable sounds) compatible hardware wavetable brings the hottest multimedia software to life. Sonic Impact accelerates today's newest audio standards in Microsoft's DirectSound® and DirectSound 3D, which take advantage of all the audio features built into the Windows® 95/98, and Windows NT 4.0 operating systems. You also get full support for older, real-mode DOS games. It simply can't be beat. Add Sonic Impact for crystal clear audio fidelity today. **Accelerate your world.**



Enter the Sonic Impact Sweepstakes by visiting our website at <http://www.diamondmm.com/sonicimpact>



This is an ad for anyone
who's had a problem with
a PC Card. For those
who haven't, thanks for
buying one of ours.

¹ Limit one trial PC Card per qualified business customer per site. Dollars in U.S. Currency. *Capable of receiving at up to 54 Kbps and sending at up to 32.2 Kbps. Due to FCC regulations, receiving speeds are limited to 53 Kbps. Actual speeds may vary. Requires compatible phone line and server equipment. Complies with Vpp, the determined ITU-T 56K standard and x2 technology protocols. Standard officially determined in February, 1998; ratification expected in September, 1998. See www.3com.com/56k for details. © 1998 3Com Corporation. All rights reserved. 3Com, the 3Com logo, Magahertz, and NACK are registered trademarks of 3Com Corporation or its subsidiaries. Spectrum Connected is a trademark of Spectrum Information Technologies, Inc. All specifications are subject to change without notice. Spectrum Connected™

Slide the PC Card into the slot. Plug in the cord.

And then what? Cross your fingers? Pray?

Make a wish?

If you're a 3Com® Megahertz® PC Card user, you connect. Just like you'd expect to. That's because we've engineered the uncertainty out of our PC Cards. **3Com Megahertz**

How can we be so sure our PC Cards will work right out of the box? We test each one before we put it into the box. And guarantee it for life. Which means you can be sure you're not installing a problem into your notebook.

We've also designed our PC Cards to be easier to live with. Set up is made simpler thanks to Intelligent Auto Install. Upgrades easier with Flash DSP. And extra cables eliminated by our exclusive XJACK® connector.

And our complete line of reliable PC Cards offers high-performance connections to 10 Mbps, 100 Mbps and Token Ring LANs, phone lines at up to 56 Kbps, cellular and ISDN lines.

Visit www.3com.com/gomobile to try the newest Megahertz PC Cards at an over 50% savings* and put PC Card problems behind you.



Guaranteed compatible with 56K* (V.90 ITU standard).



Optimum performance with Parallel Tasking®.



Integrates Megahertz® and 3Com® technology.



SUMMARY OF FEATURES

ISDN Routers



	ACC Cengo Personal Router	Arescom Apex 1100-3	Ascend Pipeline 75	Bay Networks Nautica 200	Cisco 766	Ramp Networks WebRamp Entré	Shiva AccessPort 2.0
■ YES ■ NO □ OPTIONAL							
List/street price of tested configuration	\$645 / \$340	\$679 / \$450	\$995 / \$640	\$595 / \$390-\$540	\$799 / N/A	\$849 / \$750	\$795 / \$630
Maximum number of users	4	Unlimited	Unlimited	Unlimited	4 ¹	253	16
Warranty	15 months	3 years	1 year	1 year	1 year	1 year	1 year
Setup							
Wizards-based setup	■	■	■	■	■	■	■
Setup via GUI/HTML	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Setup via console (serial connection)	■	■	■	■	■	■	■
Auto-SPID detection	■	■	■	■	■	■	■
Line-speed detection	■	■	■	■	■	■	■
Configurable for both dynamic and static IP addresses	■	■	■	■	■	■	■
Vendor provides ISDN-provisioning services	□	■	■	■	■	■	□
Remote configuration	■	■	■	■	■	■	■
Upgrade via FTP download/flash	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Hardware Features							
POTS (RJ-11)/Ethernet ports	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	2 / 4	2 / 1
10Base-T/coax/AUI LAN connection	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
ISDN/Ethernet/serial cable included	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Status LEDs for POTS (RJ-11)/B-channels	2 / 1	2 / 1	1 / 1	1 / 1 ²	2 / 6	0 / 2	0 / 2
Status LEDs for LAN/power	2 / 1	2 / 1	1 / 1	1 / 1 ²	3 / 1	5 / 1	1 / 1
Number of ringer-equivalent lines	3	3	4	1	5	5	1
Optional ST interface	■	■	■	■	■	■	■
Token-Ring version available	■	■	■	■	■	■	■
Internal/external power supply	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Switch support:							
National ISDN-1	■	■	■	■	■	■	■
AT&T 5ESS	■	■	■	■	■	■	■
Northern Telecom DMS-100	■	■	■	■	■	■	■
Supports HiFi/MPPC/Ascend compression	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Software Features							
Dial on demand	■	■	■	■	■	■	■
Gives preference to data calls over voice calls	■	■	■	■	■	■	■
Call bumping	■	■	■	■	■	■	■
Bandwidth on demand	■	■	■	■	■	■	■
Supports three-way conference calling	■	■	■	■	■	■	■
Supports call transfer	■	■	■	■	■	■	■
Management							
Limit use by time/day/user	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Monitors call activity/call usage	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
On-screen display of B-channel status	■	■	■	■	■	■	■
Logs call statistics/security information	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Provides agents for SNMP/RMON	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Protocols Supported							
DHCP	■	■	■	■	■	■	■
BACP	■	■	■	■	■	■	■
IP / IPX / AppleTalk routing	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
PPP and Multilink PPP support	■	■	■	■	■	■	■
IP / IPX bridging	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
AQ/DI (X.25)	■	■	■	■	■	■	■
Security Support							
Network Address Translation (NAT)	■	■	■	■	■	■	■
PAP / CHAP / MSCHAP authentication	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Calling-line identification	■	■	■	■	■	■	■
Calling-line authorization	■	■	■	■	■	■	■
Dial-back	■	■	■	■	■	■	■
IP filtering on source and destination	■	■	■	■	■	■	■

N/A—Not applicable; Cisco does not quote street prices, which vary by location. (1) A software remote upgrade (\$150 list) supports up to 1,500 users. (2) This router has a single multifunction LED.

NETWORKING

Personal ISDN Routers

3Com OfficeConnect ISDN LAN Modem	ZyXEL Prestige 100	ZyXEL Prestige 128
\$499 / \$370	\$499 / \$380	\$699 / \$570
10	Unlimited	Unlimited
Lifetime	2 years	2 years

■	■	■
■	■	■
■	■	■
■	■	■
■	■	■
■	■	■
■	■	■
■	■	■
■	■	■
■	■	■

2 / 4	2 / 1	2 / 1
■	■	■
■	■	■
■	■	■
2 / 2	2 / 2	2 / 2
1 / 1	4 / 1	4 / 1
3	3	3
■	■	■
■	■	■
■	■	■
■	■	■

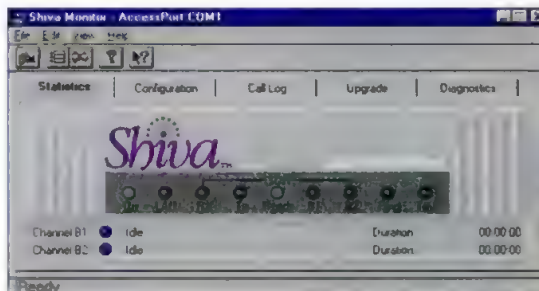
■	■	■
■	■	■
■	■	■
■	■	■
■	■	■
■	■	■
■	■	■
■	■	■
■	■	■
■	■	■

■	■	■
■	■	■
■	■	■
■	■	■
■	■	■
■	■	■
■	■	■
■	■	■
■	■	■
■	■	■

■	■	■
■	■	■
■	■	■
■	■	■
■	■	■
■	■	■
■	■	■
■	■	■
■	■	■
■	■	■

■	■	■
■	■	■
■	■	■
■	■	■
■	■	■
■	■	■
■	■	■
■	■	■
■	■	■
■	■	■

■	■	■
■	■	■
■	■	■
■	■	■
■	■	■
■	■	■
■	■	■
■	■	■
■	■	■
■	■	■



The first GUI router monitor is still the best. Shiva Monitor displays the status using LEDs that look like the attached devices.



ard-based installations, then leave you to make further changes from the command line. WebRamp's installation and administration programs are one and the same. A familiar Windows tabbed interface with pull-down menus lets you easily change your settings and monitor your calls. For example, we made calls to separate ISPs, one with and one without Dynamic IP addressing, saving both profiles to use as needed. We observed all calls via the graphical Status and Monitor screens, which show channel status, transfer rate, and the amount of data sent and received. The WebRamp Entré is a fine package for new users.—JGW

Ramp Networks WebRamp Entré. List price: Tested configuration, \$849. Ramp Networks, Santa Clara, CA; 888-726-7638, 408-988-5353; www.rampnet.com. Choose 506 at www.pcmag.com/infolink.

Shiva AccessPort 2.0



An excellent installation wizard and clever management software make the Shiva AccessPort (\$795 list, \$630 street) a top choice for networking newcomers and experienced users alike. On our tests, the setup wizards correctly auto-detected SPID and switch types, and all the administration controls were easily accessible via a point-and-click GUI. The AccessPort earns our Editors' Choice.

The router is housed in a modem-size metal box, with nine useful LEDs on the front panel. The two-color LEDs show telephone, ISDN, and LAN activity at a glance. The AccessPort also includes an on/off switch, but unlike the Congo's switch, which turns off only the data lines, this switch turns the entire unit off.

Although Shiva provides Getting Started, a brief guide, more expansive documentation is installed on your hard disk during setup. The online documenta-

tion and help screens were among the best we saw, providing helpful hints and excellent tutorials found nowhere else. Shiva includes all necessary cables with the unit, and like those of the Cisco 766, they're color-coded to simplify setup.

Shiva was the first router vendor to provide an installation wizard, and its current wizard is the best in its class. We installed by loading the software on our computer and answering a few questions. The wizard did the rest for us, automatically determining our SPID and switch information. At the end of the installation process, the wizard even made a test call to our ISP to ensure that everything worked correctly. The entire process took about 10 minutes.

After installation, Shiva Monitor lets you make additional configuration changes and monitor the unit's operation. The monitor was easily the best administration utility we tested. It uses an easy-to-navigate, five-tabbed interface to provide monitoring, configuration, logging, and diagnostic functions in one straightforward program.

The Statistics tab gives you a useful graphical replication of the AccessPort's front panel—complete with flashing LEDs—and the Configuration tab shows the rear panel. Altering the configuration settings is simple: Click on the appropriate part of the picture. For example, clicking on the ISDN connector takes you to the ISDN settings screen. Setting up multiple routing destinations was a snap, and we were able to fine-tune the connection profile for each of our remote routers easily.

Shiva Monitor provides excellent activity logging, detailed usage statistics, and useful troubleshooting information. Our favorite feature was the ISDN Chan-

THE NEW CUSTOM-BUILT COMPUSA PC.[™] EVEN THE PRICE IS MADE TO ORDER.

At CompUSA®, we know that no two people are exactly alike. That's why we've created the new CompUSA American Series, each one made to order so you get the precise options and features you need.

Built with quality components from names like Intel® and Microsoft, each CompUSA PC comes with a three-year parts guarantee and a one-year labor guarantee with the first year available on-site. We also offer lifetime hardware support through our toll-free help line.

For your added convenience, upgrades and maintenance are available at more than 150 CompUSA Computer Superstores located all across the country, each one staffed with experienced reliable technicians.

For more information, you can call our toll-free number, see our Web site configurator, come into any CompUSA or, if you're a corporate customer, simply call your Account Executive.



COMPUSA PC[™]

Custom Built for You.

Call today for your custom configuration.

Monday - Friday 7am - Midnight ET

Weekends and Holidays 8am - Midnight ET

1-888-260-7984

www.compusa.com

Choose 228 at www.pcmag.com/infolink

NO PAYMENTS, NO INTEREST for 6 MONTHS*

*Must be paid in full within 6 months from the date of purchase. Minimum total purchase of \$299 is required. Subject to credit approval. Applies to purchases made with the CompUSA consumer credit card. Accrued finance charges will be assessed from the original date of purchase if balance is not paid in full within six months. Valid on purchases made through Saturday, 5/2/98 only. As of January 25, 1998, the CompUSA credit card annual percentage rate (APR) is 22.30%. APRs vary; minimum monthly finance charge of \$1.00 may apply. Credit is provided by Beneficial National Bank USA. Standard shipping and handling \$48.00. Delivery time dependent upon customer shipping preference. *56K Modems are capable of downloads at 56Kbps, but speeds in actual use may vary. All trademarks are the property of their respective companies. The Intel Inside logo and Pentium are registered trademarks and MMX is a trademark of Intel Corporation. CompUSA PC and Custom Built for You are trademarks and CompUSA and CompUSA Direct are registered trademarks of CompUSA Management Company. © 1998 CompUSA Management Company.

COMPUSA PC[™] AMERICAN

Intel 233MHz Pentium® Processor with MMX™ Technology • 32MB SDRAM • 2.1GB EIDE Hard Drive • 24X CD-ROM Drive • 56K*/14.4 Data/Fax Modem • 14" SVGA, .28 NI Monitor (13.2" Viewable Image Size) • 2MB Video Card • 16-Bit PNP Audio Card • 6.5Watt Speakers • Microsoft Windows® 95 • 104-Key Keyboard

\$999⁹⁵

Technology Assurance Program

3-Year 172123 \$129.97 Plus shipping and handling*
5-Year 172124 \$239.97 818565

COMPUSA PC[™] AMERICAN

Intel 233MHz Pentium®II Processor • 32MB SDRAM • 4.3GB EIDE Hard Drive • 32X CD-ROM Drive • 56K*/14.4 Data/Fax Modem • 15" SVGA, .28 NI Monitor (13.8" Viewable Image Size) • 4MB 3D Video Card • 32-Bit PNP Audio Card • Altec Lansing 9Watt Speakers • Microsoft Windows® 95 • Microsoft IntelliMouse • 104-Key Keyboard

\$1399⁹⁵

Technology Assurance Program

3-Year 172123 \$129.97 Plus shipping and handling*
5-Year 172124 \$239.97 818592

COMPUSA PC[™] AMERICAN PRO

Intel 333MHz Pentium®II Processor • 64MB SDRAM • 6.4GB Hard Drive • 32X CD-ROM Drive • 56K*/14.4 Data/Fax Modem • 17" SVGA, .28 NI Monitor (15.8" Viewable Image Size) • 4MB STB Velocity 128 AGP Video Card • Altec Lansing 26Watt Speakers • Microsoft Windows® 95 Small Business Edition • Microsoft Windows® 95 • 104-Key Keyboard

\$2299⁹⁵

Technology Assurance Program

3-Year 172123 \$129.97 Plus shipping and handling*
5-Year 172124 \$239.97 818612

COMPUSA PC[™] AMERICAN PRO

Intel 400MHz Pentium®II Processor • 64MB SDRAM • 8.4GB Hard Drive • 32X CD-ROM Drive • 56K*/14.4 Data/Fax Modem • 17" SVGA, .28 NI Monitor (15.8" Viewable Image Size) • 4MB STB Velocity 128 AGP Video Card • Altec Lansing 26Watt Speakers • Microsoft Windows® 95 • 104-Key Keyboard

\$2699⁹⁵

Technology Assurance Program

3-Year 172123 \$129.97 Plus shipping and handling*
5-Year 172124 \$239.97 818634

SYSTEM UPGRADES

CALL AN ACCOUNT REPRESENTATIVE FOR PRICING

Upgrade From 4.3GB to 6.4GB Hard Drive
Upgrade From 6.4GB to 8.4GB Hard Drive
Upgrade From 32MB to 64MB RAM
Upgrade to a Microsoft Natural Keyboard
Iomega Zip 100MB Drive
DVD 20X CD-ROM Drive

nel Detail display, which shows a real-time speedometer display of traffic on both B-channels. You just can't go wrong by choosing the Shiva AccessPort.—**LF**
Shiva AccessPort 2.0. List price: Tested configuration, \$795. Shiva Corp., Bedford, MA; 800-977-4482, 781-270-8300; www.shiva.com. Choose 507 at www.pcmag.com/infolink.

3Com OfficeConnect ISDN LAN Modem

Marketed specifically to networking neophytes, the 3Com OfficeConnect ISDN LAN Modem (\$499 list, \$370 street) isn't a modem at all; like the Ramp Networks WebRamp Entré, it's a combination IP router/four-port Ethernet hub. Reassuringly, the company offers a full refund if you can't install the unit in 15 minutes. Behind this friendly face is a serious router that provides rich features and smooth, fault-free operation. Still, we found that setup using WebWizard (a browser-based program) was not too smooth; networking newcomers will want to be on guard.

Setup was indeed speedy but not as automated as promised. We could have had the router for free after our 30-minute installation. WebWizard walked us through the process, prompting us for only an ISP access number and user identification information. But while it tried to configure itself to our phone lines, it balked at automatically entering the SPID. The good news is that the program notified us that SPID identification wasn't possible and let us enter the value manually. But as we entered the correct SPID as well as incorrect values to test the program, WebWizard required us to reenter our password with each attempt.

If you should make a mistake with your configuration settings, a helpful maintenance menu lets you reset the OfficeConnect or set it back to factory defaults if you want to start fresh.

Once we configured it, the product worked perfectly. It allocated bandwidth automatically, going to both ISDN lines when we downloaded a large file and then bumping back to one line to allow an incoming POTS call. For SOHO and home users (with a little experience) hoping to gain two extra regular phone lines with reliable access, the 3Com product is a good solution, and it supports caller ID to boot. Overall, it may not be the best choice for new users, but the OfficeConnect is a strong player.—**BB**

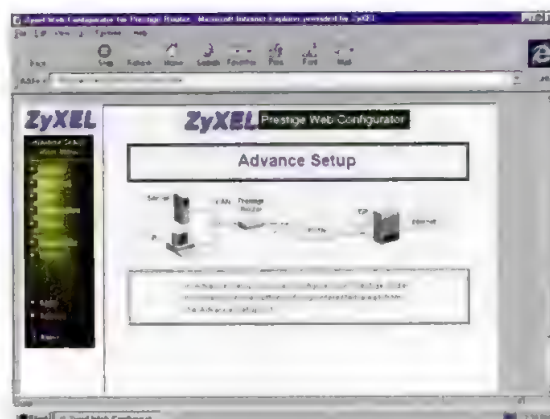
3Com OfficeConnect ISDN LAN Modem. List price: Tested configuration, \$499. 3Com Corp., Santa Clara, CA; 800-638-3266, 408-764-5000; www.3com.com. Choose 508 at www.pcmag.com/infolink.

ZyXEL Prestige 100, 128

ZyXEL Communications targets home and small-office users with the ZyXEL Prestige 100 (\$499 list, \$380 street) and the Prestige 128 (\$699 list, \$570 street). And this audience will certainly find the Prestige 100's price attractive. But the units are lacking in some important areas. We found them difficult to install and administer, primarily because they have neither Dynamic Host Configuration Protocol (DHCP) nor automatic Domain Name Server (DNS) support. Also, they don't provide an always-available incoming POTS connection, desirable for home users. But the

Prestige 128's protocol, security, and management support make it a fair candidate in environments where POTS may be less crucial. With some attention to the user interface and DHCP support, these routers could become very competitive, in view of their great pricing.

Though the products are physically identical, the Prestige 128's bridging capability, IPX routing and spooling, and RADIUS authentication make it more appropriate for small



ZyXEL's Prestige Web Configurator is a Java applet used for configuration and administration.

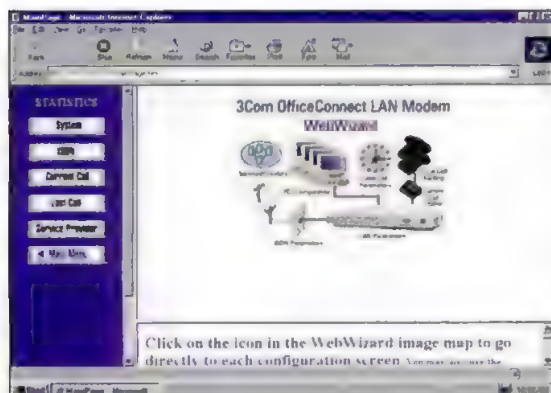
corporate groups and branch offices.

The Prestige routers perform ISDN line handling adequately, but configuration is extremely difficult for both. Though ZyXEL's new Java applet-based Prestige Web Configurator (which we tested in beta) helps somewhat, the current version does not compare well with other products' setup wizards. In fact, these are the only products we tested that don't include wizard-based software.

Compared with the other products that automatically assign IP and DNS information, the Prestige routers fall somewhat short. In their current iteration, they require you to specify an IP address and DNS address for each system on the network and input them manually. Although the products will support DHCP when Web Configurator is in final form, you still have to store a pool of IP addresses and DNS information in the routers.

Once configured, though, the Prestige routers do a fine job of allocating bandwidth, adding the second channel when necessary, and dynamically distributing the throughput among users. The Advance Setup menu lets you obtain status and diagnostic information and specify settings for various factors, such as call duration and time limits on adding or dropping the second channel.

The Prestige routers do not support analog caller ID or accept incoming calls when both ISDN channels are active.—**BB**
ZyXEL Prestige 100. List price: Tested configuration, \$499. **ZyXEL Prestige 128.** List price: Tested configuration, \$699. ZyXEL Communications Inc., Anaheim, CA; 800-255-4101, 714-693-0808; www.zyxel.com. Choose 509 at www.pcmag.com/infolink. **PC**



The 3Com OfficeConnect's WebWizard is an HTML application that aides configuration and operation.

UNMANAGED ETHERNET HUBS

E5 Unmanaged 5 port hub	\$48.**
E8 Desktop 8 port hub	\$64.**
E16 Desktop 16 port hub	\$169.**
E24 Desktop 24 port hub	\$239.**



UNMANAGED FAST ETHERNET & ETHERNET SWITCHES

S2 Unmanaged 2 port switch	\$259.**
S10 Unmanaged 10 port switch	\$599.**

FAST ETHERNET/ETHERNET NWAY SWITCH

S8n NWay switch	\$999.**
8 100Base-TX/10Base-T ports	

CABLES

Category 5 UTP cable

U3 - 3ft	\$2.**
U7 - 7ft	\$3.**
U10 - 10ft	\$3.**

DESKTOP ADAPTERS

C1 Ethernet adapter auto-sensing 8/16 bit ISA design	\$22.**
C10 Ethernet adapter 32 bit bus master PCI design	\$33.**

C110 Fast Ethernet adapter 10/100Mbps auto-sensing PCI interface

\$48.** Quantity pricing available

CONNECT DIRECT AND SAVE!™

Atlantic City Casino Strip



Greetings, Amertek!
Your Ethernet hubs work great!
"Connect Now, Pay Later" deal freed
up Company's cash flow. Have
"re-routed" funds to send self on
gambling junket. (Don't tell my
boss!) @ Met nice lady here.
She's in entertainment industry,
but self-employed.

Told her about your
offer. She made me
one, too. Gotta go!

-Bruno Santana
ex-LAN-tic city, NJ

Connect Now, Pay Later!™

When you're running a business, cash flow is almost as important as a reliable network. That's why Amertek developed the "Connect Now, Pay Later!" program*. On approved credit, you don't pay for six months—no interest or payments.

Amertek™ hubs, switches and adapters are among the best in the industry, and come with full technical support and a lifetime warranty—at factory direct prices! Connect direct and save!

* On approved credit from an independent finance company. You will pay no interest and make no payments for six months. You will be allocated a revolving limited credit line for your company's use. At the end of six months, you can opt to carry on with a term lease or pay the balance in full. After six months, interest will begin accruing. You may order direct anytime on your account. Prices and specifications subject to change without notice or obligation. Amertek and its agencies are not responsible for Errors and Omissions. Taxes, shipping and handling extra.

*Amertek, Connect Direct and Save!, and Connect Now, Pay Later! are trademarks of Amertek Networks Corp.

CALL 1-800-657-6910 TO ORDER

UNMANAGED FAST ETHERNET HUBS

F8s Stackable 8 port hub	\$359.**
F16s Stackable 16 port hub	\$699.**



10/100 DUAL-SPEED HUBS

F4d Dual-Speed 10 or 100, 4 port hub	\$99.**
F8sn 8 port 10/100 NWay stackable hub with built-in switching module	\$469.**
F16sn 16 port 10/100 NWay stackable hub	\$499.**
Fm Switching module for F16sn	\$269.**

On-line catalog

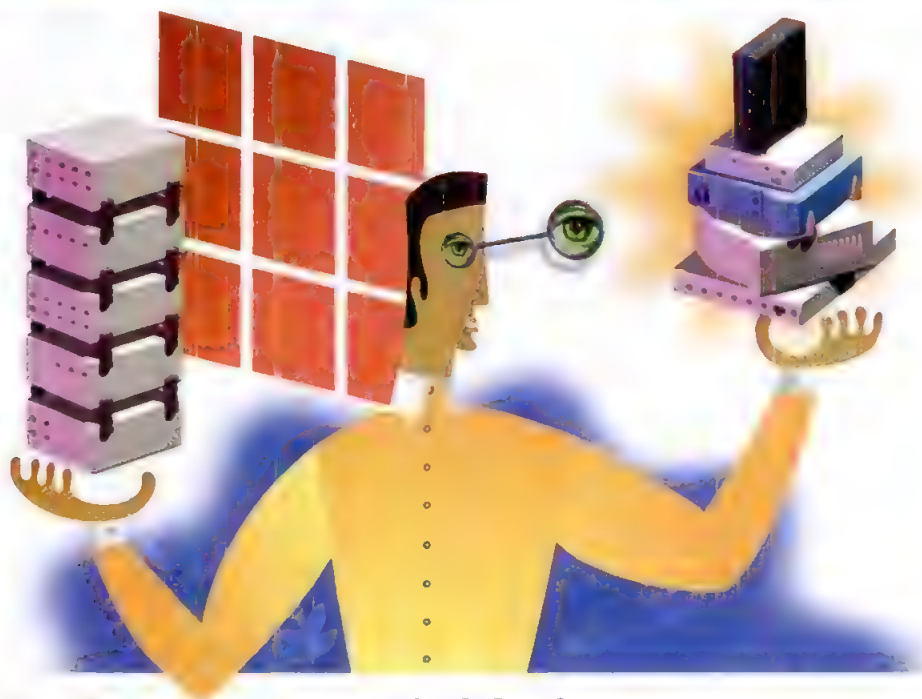
• www.amertek.com

NEW

Choose 062 at www.pcmag.com/infolink



Net Tools



A Family Affair

The major players now offer lines of small-office networking products. But is there any reason to stick with one vendor?

By Steve Rigney

Walk into a wiring closet in a typical corporate network and you're likely to see 19-inch racks filled with components from one or two networking vendors. Walk into the wiring/broom closet of a small-office network and you're likely to see a mess of hubs and switches from every vendor you can think of.

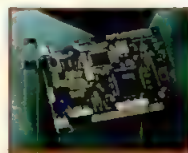
There are two reasons for this. First, it's been only two years or less since the major players—Bay Networks, Cisco, and 3Com—caught on to the fact that small offices of 2 to 100 users are

one of the fastest-growing segments of the networking market. According to market research firm IDC, the number of networked companies with 100 or fewer employees grew from 1.07 million in 1996 to 1.28 million in 1997, and IDC projects that number will be over 2 million by the year 2000. In response, the major networking vendors and several second-tier ones have come out with new product lines specifically targeted at small-office environments. These product lines feature entry-level hubs, switches, ISDN routers, print servers, and other networking

INSIDE

SMALL-OFFICE NETWORKS

have finally earned the attention of the market's heavy hitters. Contributing editor Steve Rigney evaluates the small-office lines of Cisco, D-Link, Intel, NetGear, and 3Com. But is it worth turning all your business over to a single vendor?



LAN MONITORING Real-time Ethernet data capture and monitoring need not bust your budget. Contributing editor Les Freed explores the latest products from Shomiti Systems. *Page 217.*

WEB MANAGEMENT

Contributing editor Padraic Boyle tests WindDance Networks' WebChallenger, an all-in-one Web site and Web server analysis tool. *Page 217.*

CACHING PROXY SERVER

Internet access costs out of control? Freed reviews Network Appliance's NetCache C630, which delivers near-instantaneous access to previously cached pages. *Page 218.*

IS IT SAFE? Secure transactions across the Internet earns scrutiny from IS to Congress. But do we really know what takes place under the hood of Web-server software? Contributor



Jeff Downey reveals the key to confidential client/server exchanges. *Page 221.*

www.pomag.com

NetTools Online
Visit our Web site to view
this story and our online
archive of networking
coverage.

Net Tools

SOHO NETWORKS

products that offer ease of use, clear documentation, and technical support geared to the novice.

Second, unlike corporate IS, most small-office networking consultants or de facto administrators look for the best, most reasonably priced tools for the job and don't worry too much about vendor relationships.

REVIEW CRITERIA

In this roundup, we review small-office networking product lines from Cisco, D-Link, Intel, NetGear, and 3Com. NetGear is actually a business unit of Bay Networks. Our goal was to examine each for the breadth of its product line, product features, affordability, ease of use, and technical support. We also wanted to see if there was any real advantage to buying all network hardware from a single vendor.

Our conclusion: For a small business, the benefits of buying from a single vendor are few and minor. The most obvious is that you can get all your technical support from one place. We also found that certain vendors offer products that have a consistent look, feel, and documentation. In the case of Cisco, Intel, and 3Com, you can even snap the various products together into neat stacks that sit on a desk or in the corner of a closet. But we found these to be minor benefits compared with general affordability and usability, and we do see reasons to cross vendor lines to buy the best tool for the job.

No matter how small the network, it needs certain basic components. We asked each vendor to provide us with a 10-Mbps Ethernet hub, a 100-Mbps Fast Ethernet hub, a 10/100-Mbps Ethernet switch, and an Inter-

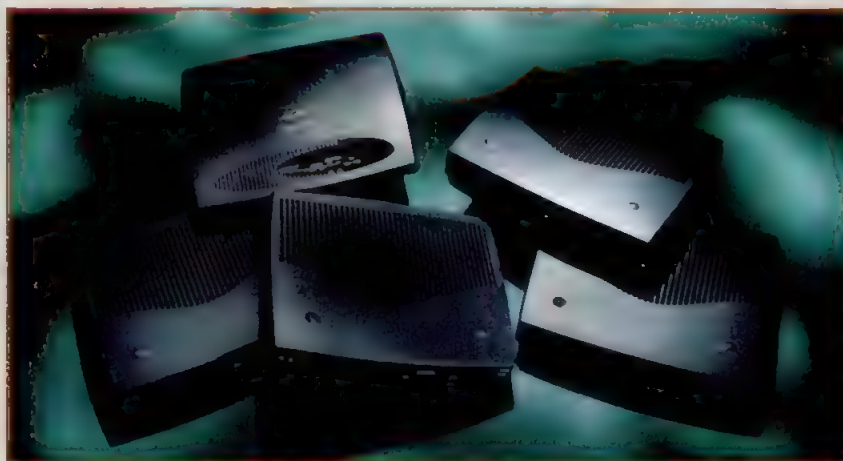
net connection device, such as an analog or ISDN dial-up router. We also let the vendors provide other family products that fit into the small-office space. The Intel InBusiness family of products we reviewed consisted only of hubs, switches, and an ISDN router, but the Cisco, D-Link Office, and 3Com families offered a more flavorful mix. 3Com's OfficeConnect, for example, includes all of the basic hubs, switches, and router, plus fax,

wall along with the standard connectivity devices. The NetGear family of products includes an inexpensive PCI 10/100-Mbps

Ethernet adapter in addition to its hubs, switches, and router.

AFFORDABILITY

When it comes to purchasing network hardware, small businesses are especially likely to make low cost a priority. The most basic



AN INTERNET STACK At \$1,495 (list), Cisco's 1605 ISDN router is more expensive than the other routers reviewed in this roundup, but it's the only one that comes with two Ethernet ports. Protection comes in the form of optional Cisco IOS Firewall software, which eliminates the need for a separate standalone box.

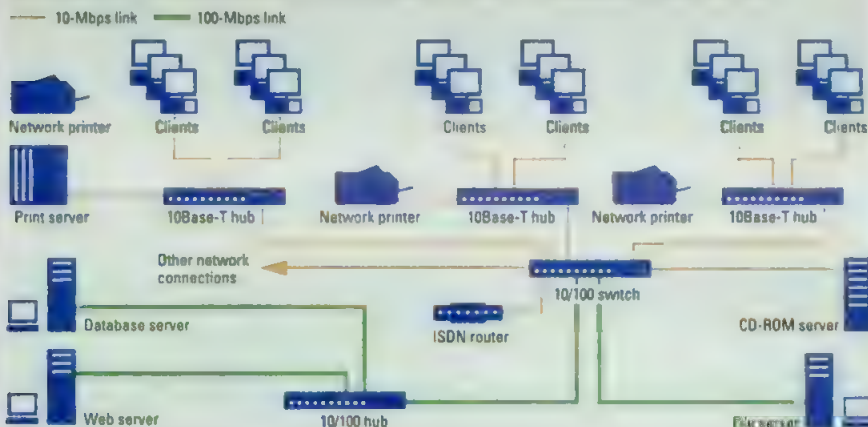
CD-ROM, and print servers that were developed by Castelle. The D-Link Office family offers a print server to round out its line, and Cisco's Networked Office Stack is the only player to include a Web server and fire-

component you'll probably need is a standard 10Base-T hub. We found that a lot of vendors are moving away from straight 10Base-T hubs to 100-Mbps hubs and 10-Mbps switches, but you can still find an inexpensive standard Ethernet hub. For example, the InBusiness standard 8-port hub retails for \$99 (list), or about \$12 per port. A managed 10Base-T hub, such as the OfficeConnect 8/TP costs about \$50 per port, and you can expect to pay about \$60 per port for 100-Mbps connectivity. Switched Fast Ethernet devices are the most expensive among the products in each family and retail for about \$75 per port.

The largest difference in price we saw among like products was with the Internet connectivity devices. On the low end stands the NetGear RT 328 ISDN router (\$449 list), whereas the Cisco 1605 (\$1,495 list) comes in on top. But the Cisco 1605's high price tag is based on a powerful feature set that includes dual Ethernet ports in addition to an ISDN connection. The \$499 InBusiness Internet Station is an inexpensive solution, and it's unique in letting you use an analog or ISDN modem for connecting to the Internet. (Note that this

Family Ties: How Small-Office Suites Connect

In this typical topology, each hub links to six PCs and a printer or print server. The hubs connect to the 10/100 switch, which segments network traffic. The switch also provides contention-free connections to shared devices such as the ISDN router and the CD-ROM server. In addition, it offers 100-Mbps links to the file server and to a 10/100 hub, which is connected to other servers.



price doesn't include the modem option.)

Other related issues to consider are the warranty and technical-support policies that come with the products. Fortunately, all of the vendors except 3Com provide free technical support. And the first call to 3Com is free, but after that you'll have to pay \$3 an hour. Likewise, most of the products in this roundup come with limited lifetime warranties. The Cisco products are the only ones limited to a one-year warranty. NetGear is the only vendor that provides 24-hour, 7-day technical support.

USABILITY

All of the hubs and switches reviewed here were a breeze to set up and use. The only components that took us any time to install were the routers and peripheral products such as the CD-ROM, fax, and print and Web servers. NetGear's ISDN router was the easiest to set up: We had it up and running in a few minutes. Cisco's, however, had a problematic setup and required the ISP to assign a static IP address, though the vendor claims it has provided a fix for this problem. 3Com's router was easier to set up than Cisco's, but we had trouble getting it to negotiate compression with our test Ascend router.

Another important criterion is detailed, consistent, easy-to-follow documentation. We liked the detailed illustrations provided by Cisco and Intel in their manuals. Cisco, D-Link, and Intel provide the same look and feel for all their manuals and offer background information on networking. Every product in the D-Link Office family includes a manual, complete with diagrams and a small glossary of terms.

EDITORS' CHOICE

• NetGear



All of the small-office product lines we tested for this roundup were reasonably priced and easy to set up and use. And each had its own merits. But in the end, we

found NetGear to have the best combination of extensive offerings, low pricing, ease of use, and excellent technical support. NetGear's pricing, on the average, was the lowest of the five vendors we looked at. And it was the only company to offer both 24-hour, 7-day free technical support and lifetime warranties on all its products. Though NetGear's products don't snap together in neat stacks as do those of Intel and 3Com, they take up no more space than the stacked products and are just as easy to use. And whereas some vendors' routers were more difficult to set up than we had hoped, we were able to get NetGear's up and running within minutes. At \$449 (list), it's

also the bargain of the bunch.

That's not to say that the other vendors in this roundup are slouches. Cisco's and D-Link's products are the higher priced of the group, but they also offer a little more power for the small office that's growing. With over 30 products, 3Com's OfficeConnect line is the most complete we looked at—offering some welcome extras like print servers, CD-ROM servers, and even a fax server. And the products all snap together neatly. On the other hand, Intel has pricing somewhere in the middle of the pack, and though its InBusiness line is not as extensive as 3Com's OfficeConnect line, it is perfectly adequate for the average small office.

FAMILY SYNERGY

We realize that most administrators aren't going to buy all of their network components from the same vendor simply to save time on phone calls or just because the documentation is good. A family of products should offer some type of synergy or basic integration among the different components. Though the ability to stack multiple

hubs and switches together is a nice space-saving feature, we found this doesn't really save that much space. With the exception of D-Link Office, the only product with true electrical stacking, we don't see the physical stacking of units to be a strong argument for purchasing a family of products. And unified management is not a requirement for most small offices—with the possible exception of a branch office of a bigger organization. You're better off concentrating on affordability and usability. InBusiness, OfficeConnect, and Office Stack all bundle each family member in the same style chassis and offer connecting clips that hold the units together. D-Link and NetGear did not go as far, but all of the family members have the same look and feel.

What D-Link Office lacks in physical stackability, it makes up for by offering electrical stacking and is the only product family we reviewed that does so. For example, you can stack up to five of the new D-Link Fast Ethernet hubs and switches together to appear as a single repeater on your LAN.

After reviewing all of these products, we're not totally convinced that small-office networking should be a family affair. We recommend that you read the reviews, find the individual products that suit your needs, and mix and match them as needed.



A TRUE STACK AMONG STACKABLES D-Link was the only vendor to offer true stackability in its line of hubs, and each model supports 10/100-Mbps traffic. You can stack five hubs together to form a single Ethernet repeater and still have easy "manage at a glance" capability thanks to the LEDs on the front of each unit.

Cisco Networked Office Stack

The products in the Cisco Networked Office Stack look more like small stereo components than network connectivity devices, but looks can be deceiving. Cisco, known for its WAN devices, is fairly new to the small-office market. With high-end features, such as management and 10/100-Mbps hubs and switches, the Networked Office reflects the company's large-network orientation. Though not as complete as 3Com's OfficeConnect, the Networked Office line, which includes three 10-Mbps hubs, a 10/100-Mbps switchable hub, a 10/100-Mbps switch, and a router and Web server features products that are physically

stackable and offer some of the best documentation we've seen.

The products in the Networked Office family are priced at the high end of the small-office families reviewed here. But we noticed that Cisco put a lot of effort into each product's design, including chassis, features, and documentation. The most basic member is an unmanaged 8-port hub (\$199 list). We looked at the 8-port 1503 managed 10Base-T hub (\$535 list). Up the line, the 1528 Micro Hub (\$645) provides eight 10/100-Mbps ports. As with the D-Link DFE-908X, each port can handle both speeds, and 10- and 100-Mbps ports can

communicate with each other—thanks to a bundled 2-port Ethernet switch. Like other products in the family, the 1528 Micro Hub provides useful LEDs, although they are located on both the front and back of the unit. This makes it more difficult to monitor everything at a glance. A built-in power supply lets you use a standard AC power cable.

If you need a bigger pipe for your servers and high-end users, then check out the 1548 Micro Switch (\$1,295). Like the 1528 Micro hub, the 1548 model provides 8 dual-speed ports. But unlike the hub, the 1528 unit provides a full 10- or 100-Mbps pipe to each of the individual ports.

The most powerful Internet connection device we tested in this roundup is easily the Cisco 1605 ISDN router, priced at \$2,195. The unit is all you'll need for both dial-in Internet access and LAN-to-LAN communication between remote sites. Unfortunately, we found the product to be somewhat difficult to install, despite an automatic script that sniffs the type of ISDN connection you have and sets up the TCP/IP information on your network. We found that an ISP has to assign you a static IP address, and compression and security could not be configured through the graphical set-up software. Administrators more familiar with the IOS operating system can manually install and configure the router, with a terminal or telnet connection. You can protect your network from intruders—without a separate standalone box—using the optional Cisco IOS Firewall software.

The Cisco Micro WebServer 200 (\$1,595 list) rounds out the Networked Office line. The second generation of Cisco's turnkey Web servers includes an internal 2.1GB hard disk and a faster processor. It also snaps into the Networked Office stack. We were impressed with how easy it was to set up and use this Web server on our test network, though it doesn't have the same detailed reporting as some higher-end servers.

If you're willing to pay high-end prices for high-end features, Cisco provides a lot of power for your small office LAN. **Cisco Networked Office Stack.** Cisco Systems Inc. (Desktop Connectivity Division), Fremont, CA; 800-747-3278, 510-252-0726; fax: 510-252-0915; www.cisco.com. Choose 911 at www.pcmag.com/infolink.

D-Link Office

The D-Link small-office products we tested are priced higher than those of NetGear and 3Com, but they also offer high-end features,

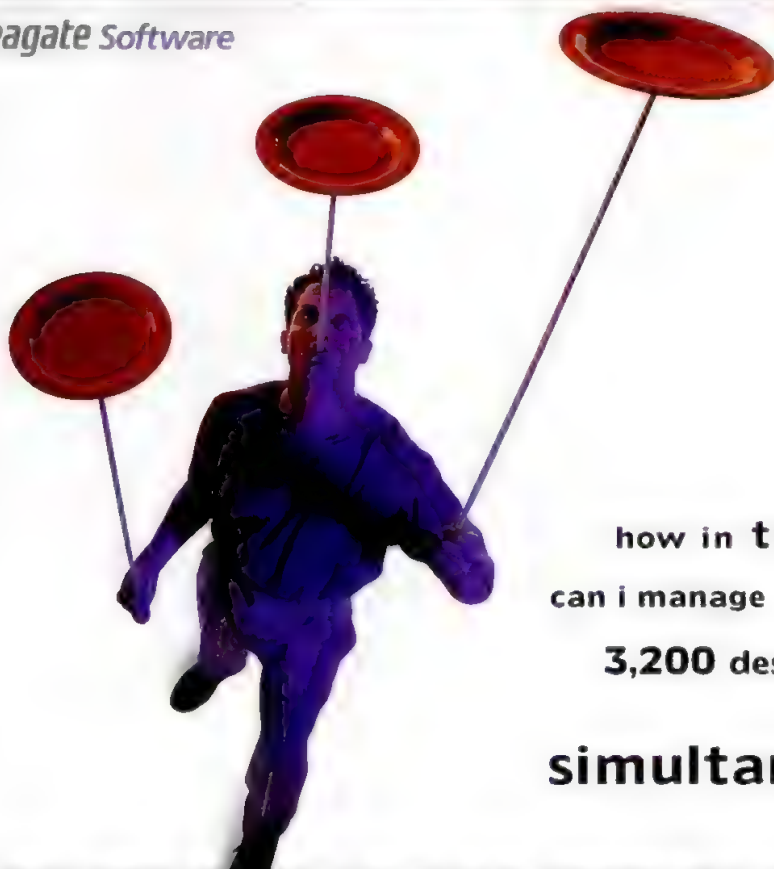
Office-Line Family Members

All prices are list	Cisco Networked Office Stack	D-Link Office	Intel InBusiness	NetGear	3Com OfficeConnect
10Base-T Hubs					
4-port unmanaged / managed	—	—	—	\$59 and up / —	\$75 and up / —
5-port unmanaged / managed	—	\$149 / —	\$79 / —	—	—
6-port unmanaged / managed	—	—	—	\$69 / —	—
8-port unmanaged / managed	\$199 and up / \$535	—	\$99 and up / —	\$79 and up / —	\$99 / \$415
16-port unmanaged / managed	—	\$295 and up / —	—	\$199 and up / —	\$255 / —
24-port unmanaged / managed	—	— / \$1,150	—	\$299 / —	—
100Base-T Hubs					
4-port unmanaged / managed	—	\$99 / —	\$245 / —	—	\$245 / —
5-port unmanaged / managed	—	\$379 / —	—	—	—
8-port unmanaged / managed	\$645 / —	\$399 and up / —	\$445 and up / —	\$300 and up / —	\$445 / —
12-port unmanaged / managed	—	—	—	—	\$645 / —
16-port unmanaged / managed	—	\$899 and up / —	—	\$995 and up	—
24-port unmanaged / managed	—	— / \$1,395	—	—	—
10Base-T Switches					
8-port unmanaged / managed	—	—	\$625 / —	\$539 / —	—
100Base-T Switches					
2-port unmanaged / managed	—	\$399 / —	—	\$349 and up / —	—
4-port unmanaged / managed	—	—	—	\$619 / —	\$595 / —
5-port unmanaged / managed	—	—	—	—	\$495 / \$895
7-port unmanaged / managed	—	—	—	\$695 / —	—
8-port unmanaged / managed	\$1,295 / —	\$1,995 / —	—	\$1,650 / —	—
10-port unmanaged / managed	—	\$999 / —	\$909* / —	\$795* / —	\$745 / —
15-port unmanaged / managed	—	\$995 / —	—	—	—
16-port unmanaged / managed	—	—	—	\$2,250 / —	—
18-port unmanaged / managed	—	\$1,595 / —	—	\$1,195 / —	—
Router	\$1,495 and up	\$999	\$499	\$449	\$795 and up
Peripherals					
CD-ROM server	—	—	—	—	\$795
Fax server	—	—	—	—	\$1,695
Firewall	\$2,495	—	—	—	Included**
Gateway	—	—	—	—	\$1,195
Network adapter	—	—	—	\$30	—
Print server	—	\$299 and up	—	—	\$389
Web server	\$1,595	—	—	—	—
Other family members	—	—	—	—	—
Technical-Support Hours (eastern time)	24 hours, 7 days	9:00–9:00 M–F	10:00 A.M.–11:00 P.M. M–F, 10:00–6:00 Sat	24 hours, 7 days	8:00 A.M.–9:00 P.M. M–F

* This product has eight 10-Mbps ports and two 10/100 ports.

** With NETBuilder routers.

 Seagate Software



how in the world
can i manage
3,200 desktops
simultaneously?

Using Seagate Desktop Management Suite™ you can inventory your network, distribute software, monitor its usage, back up

workstations & file servers, and help your users via remote control - all from one central location. **who needs an upgrade???**

whose browser is out of date? can i get them a current version right now??

The suite automatically discovers thousands of components on each network, then performs criteria-based software distribution -

standardizing desktops without tedious scripting. **which apps are being used on the network?**

by how many people? is the data protected!!!? Application activity

can be monitored and controlled (saving money on software licenses). Complete NT/NetWare backup can be scheduled.

Integration. Automation. Saving time and money is what Seagate Software's era of information availability, access, and analysis is about.

Information, the way you want it.™

• • • • • | • • • • • | • • • • • | • • • • •

For a free evaluation, 1-800-729-7894 ext. 81713 or www.seagatesoftware.com

©1998 Seagate Software, Inc. Seagate Software and the Seagate logo are trademarks of Seagate Technology. Outside of the US and Canada call 1-487-821-7501.

Choose 374 at www.pcmag.com/infolink



such as 10/100-Mbps auto-sensing ports and true stackability. The family includes an ISDN router and an easy-to-use network print server. The only major devices missing are a manageable Ethernet hub and switch. Generally, the products are easy to install and offer more room to grow than most of the other small office solutions in this roundup.

Since most of the D-Link products don't

The stackable DFE hubs are our favorite products in the family. Available in both 8- and 16-port models, these hubs offer 10/100 Mbps on every port. Note that while each port can run at either 10 or 100 Mbps, standard DFE hubs don't include any switching. This means that the 10-Mbps devices can't communicate with the 100-Mbps devices

not include any POTS connections yet provides both dial-out and LAN-to-LAN connectivity. The product

is not as easy to set up as NetGear's router, and our test unit lacked the Web-based installation that D-Link has recently made available. All these products come with a life-time warranty and free technical support during the business week.

If you're looking for a little more power and expandability than is offered by most of the other product lines that we looked at in this roundup, spend the extra money for D-Link Office.

D-Link Office. D-Link Systems Inc., Irvine, CA; 800-326-1688, 714-455-1688; fax, 714-455-2521; www.dlink.com. Choose 912 at www.pcmag.com/infolink.

Intel InBusiness

With pricing that falls in the midrange of the small-business lines we tested, Intel's new InBusiness product line is adequate for most of your needs. The InBusiness family tree spans eight different hubs and switches and includes the only router in this roundup offering both analog and ISDN connections.

Like the Cisco and 3Com products, Intel's snap together into a single compact unit that can sit vertically or horizontally in a small space or on a desktop. Pricing is generally higher than NetGear's, however, and Intel's line lacks the high 10/100-Mbps port densities offered by Cisco and D-Link. There's no print server in the InBusiness lineup, but Intel does offer its well-known family of NetportExpress print servers separately.

We looked at four hub-and-switch products, all containing 8 ports: the 10-Mbps Hub (\$99 list), the 100-Mbps Fast Hub Plus (\$445 list), the 10-Mbps Switch (\$625 list), and the



A SNAP TO SET UP Intel's hubs and switches can snap together into a single vertical or horizontal stack that can save space in a cramped environment such as a desktop. Installing each product is easy, thanks to the company's highly illustrated and well-thought-out documentation.

provide any management, they're a breeze to install—requiring no configuration other than plugging the device into the wall and turning on the power. Even the DP-300 print server and the DI-300MW ISDN router, which do require configuration software, are relatively easy to set up and maintain. Though all of the products are housed in different-size chassis, most offer the same “manage at a glance” LEDs on the front and provide an internal power supply that uses a standard power cable. This is a good feature if you don't like trying to find a space in the outlet for the external power bricks. But the DP-300, the DI-300MW, and the 4-port DFE-904 hub still require an external power adapter.

The hubs are priced at the high end, but if your office requires dual-speed ports and true stackability, then they're actually bargains. For example, the \$399 8-port DFE-908 hub (\$399 list) is a dual-speed, full-duplex Class II repeater that you can stack with four other D-Link hubs that all appear as a single repeater on the network. The DP-300 (\$399 list) is one of the least expensive two-port 10/100 print servers on the market.

plugged into the same hub. If you want to communicate between the different speeds, you'll need to purchase an 8-port DFE-908X (\$695 list) or 16-port DFE-916X hub (\$995 list). These are similar to the DFE models but include two internal switch ports. Fortunately, you can use a single X model to provide interoperability for an entire stack of hubs.

The DI-300MW routes only IP and does

SUITABILITY TO TASK

	Cisco	D-Link	Intel	NetGear	3Com
Affordability	Good	Good	Good	Excellent	Good
Usability	Good	Good	Fair	Good	Good
Family synergy	Good	Fair	Good	Fair	Good

The most obvious consideration for the **affordability** rating is the cost per port of each device in the family. More than any other sector in the networking market, small businesses are concerned with their out-of-pocket expenses and will usually settle for fewer extras in order to save money. We look at the price of each product in the family to form our rating. We also consider the price and availability of the vendor's technical support and warranty policies.

The **usability** rating takes into account installation, documentation, number and type of ports, number of products

in the family, configuration, and management software. Our favorite families offer products that are easy to install and maintain, along with useful features such as uplink ports for connecting the components.

The **family synergy** rating factors in the physical, electrical, purchasing, and technical-support benefits of buying all of the network devices you need from a single product family. We give less weight to the family synergy rating than to the other two ratings, because we feel that it's not a strong enough factor to overcome poor economy or usability

3 things a LAN Manager can count on:

More
Users.

More
Work.

10/100/1000
Networking
from 3Com.

Managing migration easily.

There are some things about your job you'll never be able to change, like how fast everything changes. Our SuperStack® II switches are the easiest way to move to the power of a switched 10/100 network. The SuperStack II Switch 3300 is fully stackable to 100+ ports, providing high performance and easy management for the entire stack.



*The SuperStack II Switch 3300.
Fully Stackable 10/100 networking with
Lifetime Limited Warranty.**

The SuperStack II Switch 3900 comes with built-in Gigabit Ethernet for unprecedented performance. Together they offer complete migration

flexibility. For your free "10/100/1000 solutions" CD-ROM call us at 1-888-689-3266, ext. 7528 or visit our website at www.3com.com/10-100solution.



*First affordable
migration to Gigabit
Ethernet offering
wire rate 9.5 million
PPS performance.
The SuperStack II
Switch 3900
10/100 switching
with built-in
Gigabit Ethernet*

Plug it in, turn it on.



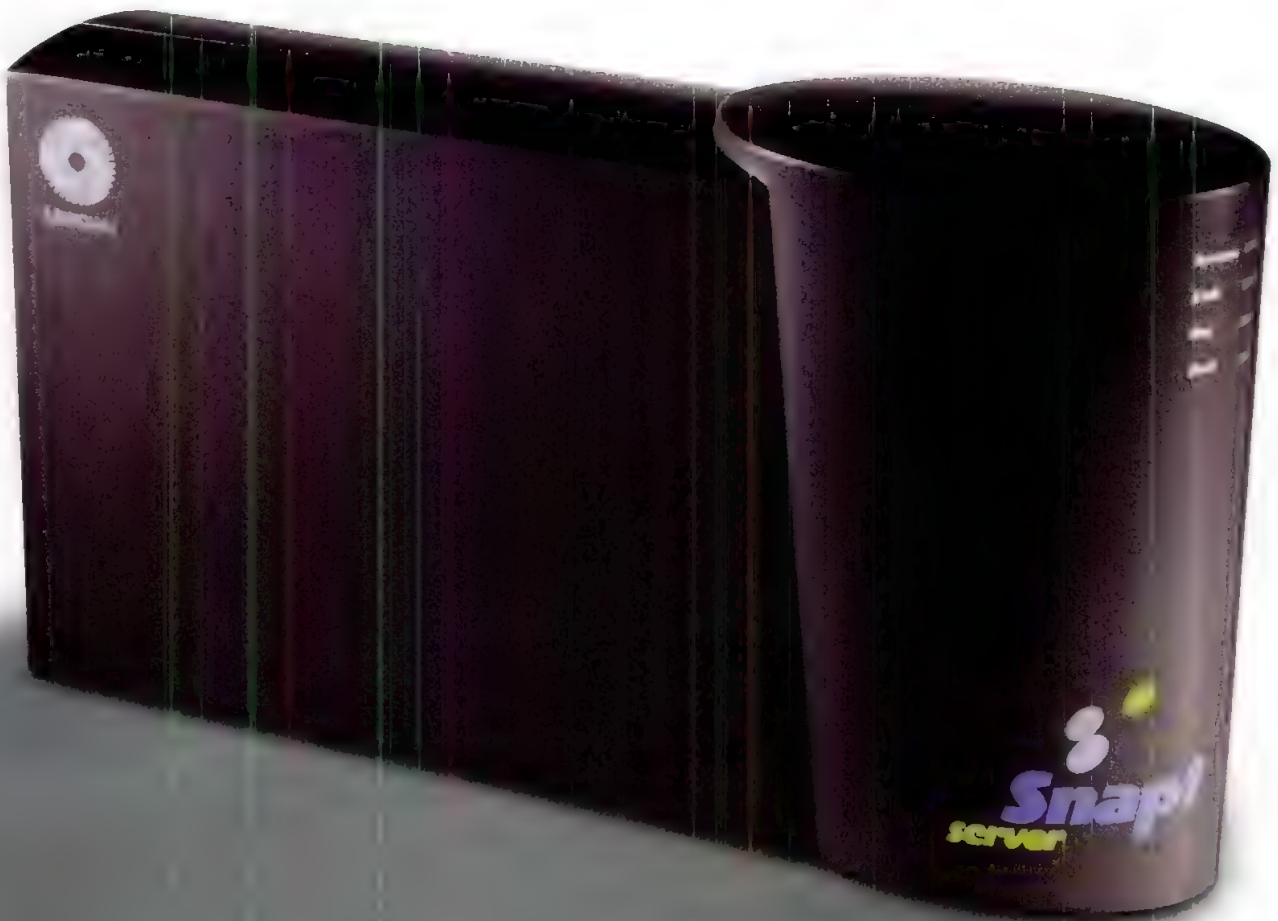
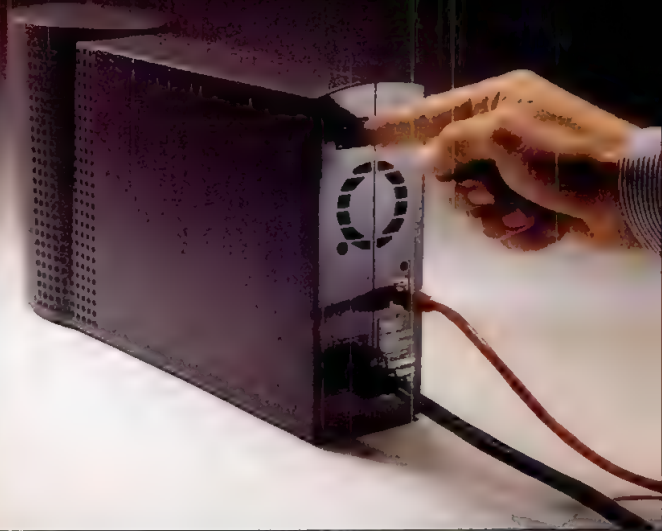
Starting at just \$995, the Snap! Server™ from Meridian Data is everything you want in a storage server.

It comes preconfigured to recognize your network, so you really can just plug it in and turn it on — with no downtime for your existing servers. And with prices ranging from \$995 for the 4GB server to 12GB for \$1795, Snap! Server redefines network storage, offering the perfect combination of quick and easy installation at prices never-before-seen for a file server. In fact, Snap! Server is so hassle-free, it comes with an unconditional 30-day money-back guarantee. And now, you could win a Snap! Server just by visiting our web site at www.snapserver.com/pcm or simply call 1-888-343-SNAP ext. 100.



MERIDIAN[®]
Network Storage Made Simple™

Now adding network storage is a Snap!



Snap! Server and Network Storage Made Simple are trademarks and the Meridian logo is a registered trademark of Meridian Data, Inc. © 1998 Meridian Data, Inc. All rights reserved.

Choose 191 at www.pcmag.com/infolink

Net Tools

SOHO NETWORKS

Switch Plus (\$909 list). The Fast Hub Plus comes with one 10/100-Mbps auto-sensing port, and the Switch Plus with two—the rest are 10-Mbps Ethernet ports. In both cases, the 10/100-Mbps ports provide bridging capabilities so that ports on hubs and switches of any speed can talk to each other. You can expand each device via its on-board uplink or crossover port, though it means that the eighth port on each unit will be disabled.

Installing each product is easy, thanks to Intel's highly illustrated and well-thought-out set-up posters and networking basics manual, which tie with Cisco for best documentation. Each hub and switch come with a handy CableKeeper Ring which helps to contain the inevitable wiring mess that seems to accompany any networking project. The LEDs are a standard fare. A single light indicates a connection or data activity. The cable connections sit on the opposite side of the units from the LEDs, so some neck craning is required to check connections against status indicators.

The Internet Station (\$499 list) consolidates any office's existing analog modem or ISDN Terminal Adapter (TA) in a shared network communication server. The unit can accommodate two PC Cards and offers an external serial connector as well as a 10-Mbps Ethernet connection. You can use any combination of three devices, though only one is shared for Internet access. Each of the two remaining modems are used on a one-at-a-time basis for remote access purposes.

In addition to handling IP routing, the Internet Station has a Dynamic Host Control Protocol (DHCP) server that distributes IP addresses to clients. Like NetGear's and 3Com's products, this router also offers Network Address Translation (NAT), which lets a single ISP account serve a whole network and thereby reduce costs. NAT also protects your network clients from outside hackers since your network is seen as a single IP address. Intel provides intuitive browser-based software to configure the modems and Internet Station settings. The software, which ships on a CD-ROM along with Microsoft IE 4.0 and modem-sharing software, accurately identified our Eicon Diva ISDN external and PC Card ISDN adapters and called our Hayes Optima modem a generic 33.6 modem. Unfortunately, we had trouble downloading profiles to the ISDN devices, so we had to set them up first, using Eicon's software. We'd like to see Intel include better troubleshooting tools.

All in all, InBusiness should fill the needs of the average small-office user. Look to NetGear for lower pricing, 3Com for a more com-

plete product line, and D-Link if you need more 10/100-Mbps ports.

Intel InBusiness. Intel Corp., Hillsboro, OR, 800-538-3373; 503-264-7354; fax, 503-677-9147; www.intel.com. Choose 913 at www.pcmag.infolink.

NetGear



The NetGear family of products received our Editor's Choice for its winning combination of ease of use, rock-bottom pricing, and 24-hour, 7-day-a-week technical support. The company offers a complete line of hubs and switches, as well as an excellent ISDN router.

Unlike 3Com's OfficeConnect line and Intel's InBusiness, NetGear's products are not identical in size, nor do they snap together in a neat stack. We found, however, that they did

as plugging in a toaster. The product's distinguishing features are a smaller physical footprint than those of the other 8-port hubs reviewed

here and easy-to-read LEDs that report link status and activity on each port.

The EN108TP's 100-Mbps big brother, the FE108 Fast Ethernet hub, is identical to the EN except for its faster speed, slightly larger footprint, and aggregate hub-utilization LED, which reports how much of your total bandwidth is being used across the hub. All ports are 100-Mbps only. An excellent feature on both hubs is the reserved eighth port that acts as an optional uplink port. It features a convenient button that lets you quickly toggle the port between normal and uplink mode. In uplink mode you can easily cascade Ethernet devices without using a crossover cable.

If you need to connect more than two FE108s or you simply want to relieve some net congestion, NetGear offers a good selec-



NOTHING BUT NET NetGear's products were the most reasonably priced of the bunch. The ISDN router, for example, was both the least expensive and easiest to configure. In its product line, the vendor also includes a low-priced PCI network adapter (\$30 street), a relatively simple but must-have product.

not take up any more space than the 3Com or Intel products. If you want true stackability, in the electrical sense, look to D-Link Office. And 3Com's OfficeConnect provides some manageable products and a slightly more complete product line. But if what you need is the basic infrastructure for a small office network at a bargain price, NetGear fills the bill. We tested the EN108TP Ethernet hub, the FE108 Fast Ethernet hub, SW510 Switch, the FA 310TX network card, and the RT328 ISDN router.

The EN108TP is a basic, unmanaged 8-port Ethernet hub. As with most 10-Mbps hubs, installation and usability are about as complex

tion of switches, including an 8-port dual-speed switch with 10- and 100-Mbps on every port that was just coming to market during our testing.

We looked at the slightly less capable SW510, which has eight 10-Mbps ports and two 10/100 ports. Like the NetGear hubs, it has an uplink button on the eighth 10-Mbps port but also adds an uplink button to one of the 10/100 ports. The FE108 was the only NetGear product we tested that had an internal power supply. We did have one small gripe: The 10-Mbps ports can't auto-negotiate duplex modes. If you want to swap modes, you must flip a DIP switch on the



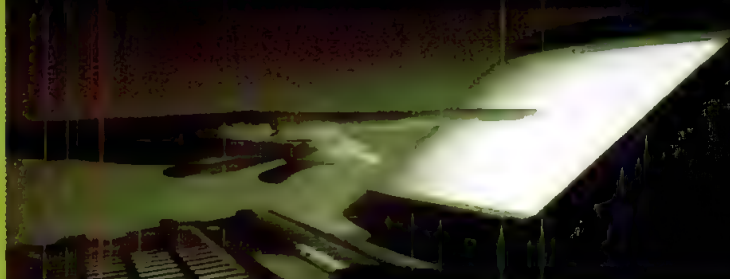
{MEET JULIE}

WHICH IS MORE
THAN SHE CAN SAY FOR
THE STOCK MARKET.

AS A
FINANCIAL ADVISOR,
JULIE KNOWS A GREAT DEAL
ABOUT STOCKS.

AND VERY LITTLE
ABOUT THE INTERNET.

EXCEPT THAT
HER FIRM'S WEBSITE WAS
**UP & RUNNING
IN 2 DAYS.**
AND HASN'T BEEN DOWN SINCE.



**30 DAY
FREE TRIAL**

{1-888-8WEBCOM x5200}

WHAT WE DO FOR JULIE: Complete Web hosting and virtual services for Julie's small business
• The fastest speed service and connectivity around • Extreme reliability • A free email address
• Microsoft FrontPage 98® support • Free 800# support • E-commerce • Iron-clad security
• Simple online configuration of all services • And some day activation • In other words, what
we do for Julie is exactly what we do for over 8,000 other small businesses • You take all the
uncertainty out of setting up and running a Web site • All for \$24.95 a month. See how on the
web or call 1-888-893-2266 x5200) **AND WHAT WE DO FOR JULIE, WE CAN DO FOR YOU.**

Choose 200 at www.pcmag.com/infolink

www.webcom.com

**WORLDWIDE
HOST to SMALL BUSINESS.**



WebCom is a registered servicemark of Web Communications. All other brand or product names are or may be trademarks of, and we used to identify

products or services. All other service marks or trademarks are the property of their respective owners.

System running wild?

Unpredictable?

Hard to troubleshoot?

Just plain unruly?

Could be you're saddled with
the wrong cabling system.

What to do? Call **SHD** for
carefully manufactured

cabling and
connectivity
products to
maximize your
performance.

At SHD, we have everything
you need — the hardware and
hard knowledge — to unbridle
the best in your network.

Tame the beast.

SHDTM
SOUTH HILLS
DATA COMM

Cabling & Connectivity Experts

Call 1-888-245-6215 today
to order a FREE copy of *The Catalog*
or to consult with an SHD Expert.

Visit our website at: www.shillsdata.com/pcm.htm

Choose 073 at www.pcmag.com/infolink

back of the unit. Fortunately the 10/100 ports could auto-negotiate.

The FA310TX 10/100-Mbps network card installed into our NT 4.0 server flawlessly negotiated speeds and duplex modes on the fly. And at \$30 (street), it's a steal.

Rounding out this review is the RT328

ISDN router. While its setup was more involved than that of the other NetGear products, of all the ones we tested it was the easiest ISDN router to install. NetGear offers an intuitive GUI interface with a wizard

Net Tools

SOHO NETWORKS

to help you set up your ISP account or remote-node connection quickly. The router also offers DHCP, NAT, and Hi/fn

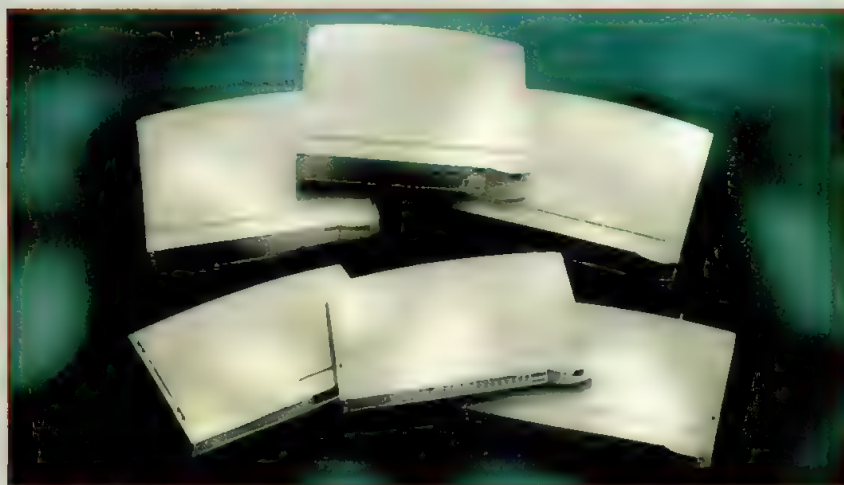
LZS (Stac) compression.

In all, NetGear provides the low pricing, features, and ease of use that most small offices demand.

NetGear. NetGear Inc., a Bay Networks Co., Fremont, CA; 888-638-4327, 510-490-4774; fax, 408-495-3397; netgear.baynetworks.com. Choose 914 at www.pcmag.com/infolink.

3Com OfficeConnect

With over 30 different products in its family, OfficeConnect is the most complete group of small-office solutions in this roundup. And aside from Intel's Inbusiness product line, OfficeConnect's products are also the most similar in look and feel: Case size and color are the same; documentation is similar; and the all products stack together—a nice feature if you're really short on space. We tested 10- and 100Base-T hubs, a dual-speed Fast Ethernet switch, an ISDN router, and fax, print, and CD-ROM servers. The servers included in this review are made

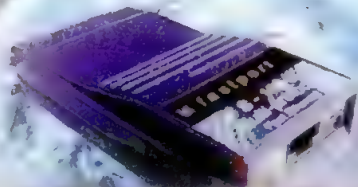


SEWING UP THE EXTRAS 3Com takes the prize for sheer breadth of product offerings, including CD-ROM, fax, and print servers. Among this sampling are 10- and 100Base-T hubs and a dual-speed Fast Ethernet switch, all of which permit easy setup.

Did you know that you can share your printer over a Fast Ethernet network?

Could your company use an improvement with its internal communications?

Ringdale has just added the **Fastport 100®** pocket sized Printserver to its already extensive product range. Unmatched in network connectivity, Ringdale manufactures the most comprehensive line of Printserver products anywhere in the world.



888 288 9080
call us toll free



RINGDALE

8305 Highway 71 West Austin Texas 78735
Ph: 512 288 9080 Fax: 512 288 7210

- The new **Fastport 100®** pocket sized Printserver offers you the world's most compact third generation printer-to-network solution for printer connectivity. Simply plug the **Fastport 100®** into the printer's parallel port!
- The **Fastport 100®** Printserver connects any laser, line, dot matrix or inkjet printer to a **10baseT** or **100baseTX** Ethernet network. The **Fastport 100®**'s "auto-detect" function means that your network type will be negotiated automatically by the Printserver.
- The **Fastport 100®** is easy to set up using **Internet/Intranet Web Browser**.
- The **Fastport 100®** is supported by both **OpenView** and **PeripheralVision®** Network Management Software.
- **FREE** software included - **Internet Printing System**, **Printer Management Software**, **SNMP**, **HTTP** and **NPMP®** management.

If you would like more information on this, or other Ringdale products, please visit our website or call our sales team toll free on the number provided.

website: <http://www.ringdale.com> e-mail: sales@ringdale.com

Choose 127 at www.pcmag.com/infolink

Net Tools

SOHO NETWORKS

by Castelle but are sold under the 3Com OfficeConnect moniker.

When it comes to pricing, the OfficeConnect products fall into the middle ground. A 100-Mbps hub costs roughly \$60 (list) per port; a 10/100-Mbps switch runs about \$100 per port. Other peripheral products, including the router, fax, CD-ROM, and print servers are also comparable in price to similar offerings from the other vendors. 3Com offers a lifetime warranty on all of its hubs and switches but not on the Castelle products, which have a three-year warranty. Unfortunately, 3Com's technical support is less generous than that of the other vendors in this roundup. You get only one free call to technical support; after that you have to pay \$3 per hour for help.

We found all of the products a snap to install, though it did take us an hour or so to set up users and other information for the fax server. With the exception of the fax server, all OfficeConnect products provide similar documentation that includes detailed instructions, diagrams, and an occasional glossary of terms. The main thing we found lacking among the family of products was a common management interface. For example, you can manage and configure the

LAN modem using a browser, but the managed 8/TPM hub requires a serial connection and proprietary software. Management is not a requirement for most small offices, but the fast-growing office should take this into consideration.

Physical stackability is a nice feature, but keep in mind that there is no electrical connectivity between the products, as there is in the D-Link Office line; again, this is not especially important in most small offices. Fortunately, all of the hubs and switches in the family let you use one of the ports as an uplink connection. Still, the TP800 Fast Ethernet hub doesn't include a 10-Mbps port, so if you want to connect it to the other 10-Mbps products in the family, you need to purchase a dual-speed switch, such as the Switch 280.

The OfficeConnect LAN modem doesn't offer the same LAN-to-LAN capabilities as the Cisco solution, and we found that we couldn't auto-negotiate compression with our Ascend test router, but it does boast some powerful features. Designed as both a four-port 10Base-T hub and an ISDN dial-out router, the LAN modem includes a full DHCP server that provides IP addresses to

all of your users, as well as Network Address Translation (NAT). Unfortunately, the DHCP server can lease only a total of ten addresses,

so if you have more users you'll have to disable the DHCP feature or go with another solution. The LAN modem is also the only member of the OfficeConnect product line we tested that can be managed using a Web browser.

The CD-ROM, fax, and print servers all work with both IPX and IP running on Windows NT, Windows 95, and NetWare networks. The CD-ROM server can share as many as seven external SCSI CD-ROMs on a network, and the print server has two parallel ports that you can use to network your printers. The fax server, available in both single and four-modem models, includes software for sending and receiving faxes from any PC on the network. We especially liked the incoming fax mailbox that let us password-protect incoming faxes from everyone but the intended recipient.

OfficeConnect. 3Com Corp., Santa Clara, CA 95052-8145; 800-638-3266; 408-764-5000; fax, 408-764-5001; www.3com.com/office.html. Circle 915 at www.pcmag.com/infolink. 



We've got your Lab results.

PC Labs Reviews

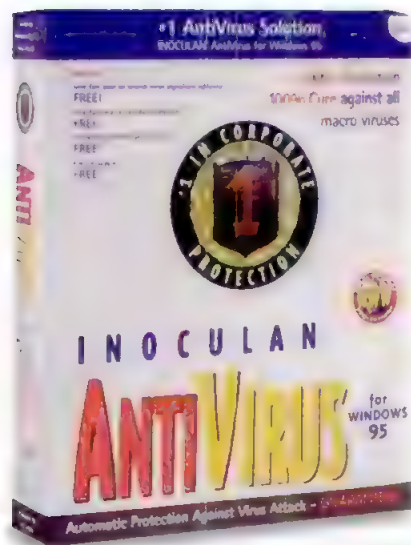
@

www.pcmag.com



Inoculan AntiVirus Beats McAfee And Norton.

Why is Inoculan® so much better than the competition?



COMPUSA
THE COMPUTER SUPERSTORE®

COMPUTER **City**

BEST BUY



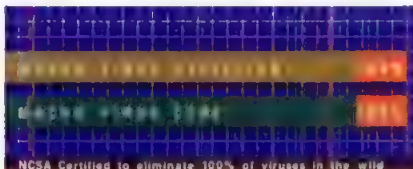
Because Inoculan detects and cures more viruses offering an unmatched 100% detection and cure rate of macro viruses

"in the wild."*

\$20**
New User
Rebate!

Because Inoculan offers both Office 97 Macro Virus and total Internet protection.

Because Inoculan is easier to install and use. And free, automatic online updates guarantee you'll always have the latest in protection.



Only Inoculan® AntiVirus™ detects and cures 100% of macro viruses.

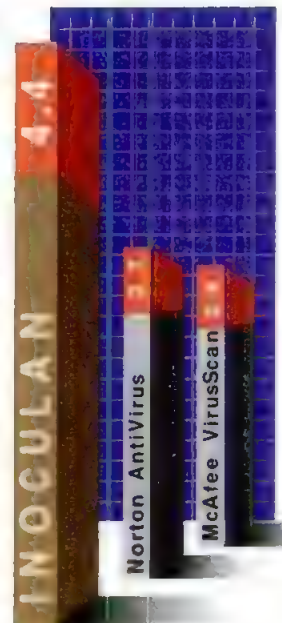
Because Inoculan is backed by a \$4 billion software company that secures and protects critical data around the clock and around the world for more than 95% of the Fortune 500.

If Inoculan can protect all of their PCs, think what it can do for you.

Pick up a copy today and take advantage of our special rebate offer.

Do it today because when it comes to something as dangerous as viruses, you simply can't afford a solution that's second rate.

**See your local reseller
or visit us at www.cal.com/AV95
for a FREE evaluation copy or
call 1-800-243-9462.**



July 1997 scores from LANtimes Virus Protection Shootout.

COMPUTER ASSOCIATES®
Software superior by design.

**IF YOUR LAN
HAS 250
NODES OR LESS,
CISCO, BAY AND
3COM HAVE A
SPECIAL SYSTEM
JUST FOR YOU.**

IT'S CALLED VOICE MAIL.

**SMC OFFERS TOP TIER NETWORKING SOLUTIONS
FOR THE REST OF US.**

Some people think 250 nodes is a small network. They're people who never had to manage one. They're also not the people to count on when you need help.

SMC is the only networking vendor with products, service and support optimized for small to mid-sized networks.

Affordable High Performance Technologies.

Our aggressively priced switches, hubs, and NICs can help you improve network performance and manageability, preserve your existing investments, and increase price/performance.

Guaranteed Service and Support

With 24-hour toll free tech support, 24-hour cross shipment, and a 30-day money-back guarantee, no one is more committed than SMC to managers of small to mid-sized networks. In fact, we live by a Customer Satisfaction Guarantee: we'll not only answer your calls, but we'll be there when you need us, with the right solution.

Contact us for more information.

SMC[®]

1-800-SMC-4YOU

www.smc.com

Choose 033 at www.pcmag.com/infolink



Net Tools

FROM THE BENCH

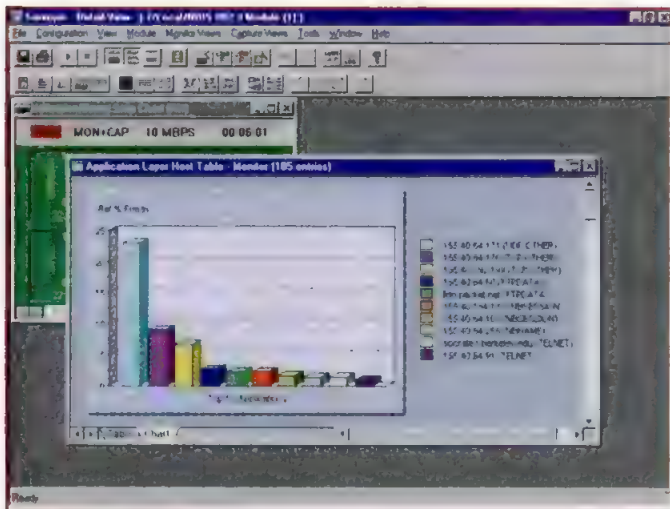
LAN ANALYZERS

Charting the LAN

By Les Freed

The new Shomiti Explorer 1.3 (starting at \$9,995 list) is one of the few laptop-size protocol analyzers on the market that offer real-time data capture and monitoring of full-duplex Ethernet and Fast Ethernet segments. But the real star is Surveyor 2.3 (\$995 list), a Windows-based tool for capturing and analyzing data,

signed hardware accelerator that lets the unit perform real-time data capture on a fully loaded 100-Mbps segment without any packet loss. The Explorer stores the captured data in a 4MB on-board RAM cache (expandable to 32MB) for later collection by Surveyor. You connect a notebook computer to the third Ethernet port using the provided crossover cable.



AMONG SURVEYOR'S many reports is one that shows the top ten traffic-generating applications on your LAN.

which works with the Explorer or as a standalone solution using a PC's Ethernet adapter. Together, the Explorer and Surveyor form a world-class analysis team that won't break your budget.

The Explorer is essentially one or two cards called Century Media modules and a 10/100 Ethernet card packaged in a portable box with its own MIPS R4000 RISC CPU. To monitor full-duplex segments, the Explorer requires two Century Media modules. Each module contains a custom-de-

The Explorer hardware would be useless without software to analyze the captured data, and Shomiti Systems' Surveyor is a match for the Explorer. The basic software provides monitoring and analysis with useful real-time statistical graphs of network usage, protocol distribution, and top traffic generators. The product can analyze data captured by one or more Explorer units or can capture data from the local PC's Ethernet card. If you have a simple, single-segment network, Sur-

veyor may be all you need.

Surveyor provides an impressive set of features, including a color-keyed, fully decoded display of each captured packet. It displays each protocol layer in a user-defined color, so you can easily choose a layer for analysis. Because Surveyor automatically learns NetBIOS, IPX, and TCP/IP names, it displays LAN devices by name rather than by MAC or IP address.

Surveyor includes extensive capture and view filters, so you can limit your search to a specific protocol, computer, or conversation between two specific computers. The application also provides an elaborate set of alarms. Each alarm can monitor a specific aspect of your LAN's activity, such as traffic and error levels and each protocol's response time, and can alert you via console message, e-mail, or pager when cer-

tain conditions are met.

Three add-on modules extend Surveyor's capabilities. Packet Blaster (\$995 list) is a sophisticated traffic-generator module that can transmit data via the local PC or through a remotely connected Explorer unit. The second add-on module is Surveyor Expert (\$1,995 list), which reports errors, offers possible causes of the errors, and recommends possible solutions. Surveyor Remote (\$995 list) lets Surveyor communicate with Explorers located on remote segments. Shomiti offers the basic Surveyor and all the additional modules in a suite for \$3,950 list. **Shomiti Explorer 1.3.** List price: \$9,995 and up. **Surveyor 2.3.** List price: Basic software, \$995. Shomiti Systems Inc., Santa Clara, CA; 888-746-6484, 408-437-3940; www.shomiti.com. Choose 901 at www.pcmag.com/infolink.

WEB SERVER MANAGEMENT

Rising to the Challenge

By Padraic Boyle

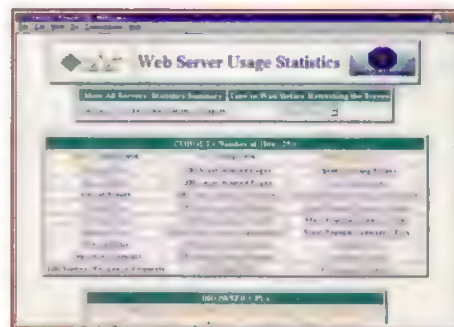
WebChallenger, from Windance Networks Corp., combines traditional Web site management with Web server management features, such as server discovery and performance benchmark testing. The product even comes with a Java-based protocol analyzer, handy for Web site troubleshooting. The result is a powerful all-in-one real-time Web site and Web server analysis tool, available in a single-server version (\$1,800 list) and a distributed version (\$2,200 list).

WebChallenger runs on Windows NT 4.0 (Server or Workstation) and requires a Java-enabled Web browser such as Microsoft Internet Explorer 4.0 or Netscape Navigator 3.0 or later. We tried using Internet Explorer 3.0 but lost some of the more advanced Java-based

graphical display features.

WebChallenger's Web Explorer automatically discovers all of the Web servers located on your network. Once it identifies the Web servers, you can use the Web Benchmark feature to measure a server's throughput continuously, based on a simulated client load.

To make sure that your Web servers are always up, the product includes Web Alarm, which lets you define various performance thresholds. If a server breaks one of the thresholds, Web Alarm sends out an alert no-



ANYTIME, ANYWHERE: WebChallenger lets you manage any Web site or Web server.

tice via e-mail or a pager.

Two features available only in WebChallenger's distributed version are load balancing among local servers and load balancing among different geographic sites. Using geographic domain names, such as .ie, .jp, and .tw, WebChallenger can direct user requests to the nearest Web server. For example, it can direct a client in Ireland to a Web server in Germany rather than a mirrored site in Taiwan.

The product also comes with a handy Java-applet packet analyzer called Web Diagnosis, which lets you capture and view packet information such as ports and

Net Tools

FROM THE BENCH

WebChallenger host on the same physical and TCP/IP network as each monitored Web server. If you have multiple geographically dispersed Web servers, you will need multiple WebChallenger hosts installed on each LAN.

Installing WebChallenger is a fairly easy task. During installation, WebChallenger configures itself to start up as a Windows NT service each time the system reboots. The program also places an icon in the Windows NT tool-

CROSS TALK



Frank Derfler

Leon, is spending \$1,800 on a Web server monitoring tool like WebChallenger a wise investment? New sub-\$1,000 turnkey Web servers are entering the market, and PC prices keep falling. Wouldn't it be easier to add more computing power than to invest in management tools?

These tools are aimed more at the \$10,000-to-\$20,000 Web server market, Frank. The biggest payback comes from the preconfigured reports and the ability to spot the traffic-generating page content quickly. Whether the Web server is on an intranet or the Internet, that's valuable data.



Leon Erlanger

source and destination addresses. This can be a handy tool for troubleshooting problems on your network and your Web site.

For Web site management, WebChallenger's Web Verify continuously checks your Web site's link integrity without user intervention. If it finds a broken link, it will send out a notification using Web Alarm.

The Web Statistics component provides a wide variety of real-time, predefined reports, which you can store as log files for later reference and analysis by WebChallenger or by third-party Web analysis products.

You can install WebChallenger on either a dedicated Windows NT system or a Windows NT host running Web server software. Because WebChallenger performs packet analysis, you must install a

bar for easy access. After you have finished installation, you can configure WebChallenger locally or remotely via a Java-enabled Web browser.

We found navigating through the Java interface fairly simple. Frames separate the menu selections, and you use a toolbar at the top of the page to select and configure each component. To capture the power of WebChallenger fully, you must configure a number of options. But if you stick with the default settings, you'll have the program up and running quickly.

WebChallenger. List price: Single-server version, \$1,800; distributed version, \$2,200. WindDance Networks Corp., Ottawa, Ontario, Canada; 613-728-1700; www.winddancenet.com. Choose 900 at www.pcmag.com/infolink.

PROXY SERVERS

Industrial-Strength Proxy

By Les Freed

If you're an IS Manager for a large organization whose Internet access costs are getting out of hand, Network Appliance's cache server NetCache is an effective way to rein in expenses, provide speedier Web access for your users, and reduce the number of your proxy servers. We tested the carrier-class Network Appliance NetCache C630, which can handle traffic equivalent to 32 T1 lines and is aimed at large enterprises. But this enterprise solution comes with an enterprise-size price tag, starting at \$65,250 list. Network Appliance also offers the C230 (starting at \$14,750 list) for medium-size companies.

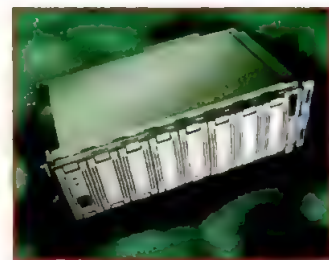
Like all caching proxy servers, the NetCache links to your corporate LAN and your Internet IP connection. Instead of connecting directly to the Internet, users set the browser's proxy address to point to the NetCache. As users request pages from the Internet, the NetCache makes local copies on its disk array. Upon each request, the cache server checks to see whether it already has that page. If so, the NetCache serves up the local copy. If the NetCache does not have the page, it requests the page from the Web server. The NetCache justifies its high price tag by its strength and speed. Network Appliance claims that the C630 has a request response time of less than 16 milliseconds. Typical software proxy servers running on fast Windows NT machines deliver Web page requests in 250 to 5,000 milliseconds.

The NetCache unit is a large rack-mounted box housing a Digital Alpha 500-MHz CPU, 512MB of RAM, a Network Appliance SCSI card, and a 10/100 LAN interface card. Our test unit came with two nine-disk external storage racks that can host up to six and seven hot-swappable 9GB hard disks, respectively. The software is fast and

compact: The system can boot from a single floppy disk. A proprietary file system, Write Anywhere File Layout (WAFL), does not have the directory and file allocation overhead of conventional operating systems.

The NetCache was easy to set up and configure. In less than 15 minutes, we connected the SCSI cables to the drives, plugged the NetCache into the LAN, and fired it up. After connecting an RS-232 terminal to assign an IP address to the solution's LAN card, all management was performed via TCP/IP telnet or through the NetCache's Web browser interface. For security, you can limit access to the password-protected administration interface to specific IP addresses. As with all proxy servers, users must adjust their browsers' proxy settings to use the NetCache's IP address. Though this process takes only a few seconds, it must be done for every LAN client.

In addition, the NetCache can act as a URL filter: An administrator can create a list of blocked



A MAJOR CONNECTION: The C630 handles up to 32 T1 connections.

URLs or domain addresses and restrict or forbid access to them. Network Appliance does not provide a premade list of URLs, but the NetCache comes with hooks for third-party lists.

Network Appliance NetCache C630. List price: Tested configuration, \$93,000. Network Appliance Inc., Santa Clara, CA; 888-352-2996, 408-367-3000; fax, 408-367-3151; www.netapp.com. Choose 902 at www.pcmag.com/infolink. PC

Data Comm Warehouse

Your **#1** Source for Networking, Connectivity and Communication Products!

Ethernet Adapters

As low as **\$9.95!**
DBN0309

- NE2000 Compatible
- 10Base-T
- ISA 16-bit

*Price after \$10 mail-in Data Comm Warehouse rebate when you purchase an NE2000 Compatible Ethernet Adapter. Maximum 25% combined rebate limited to \$1000 per account. This offer valid to 12/31/95. Not applicable to any other purchases. Price before rebate is \$19.95

3Com US Robotics

Experience the Internet like never before!

V.90 ITU Standard and X2 Compatible!

NEW!

U.S. Robotics 56K Fax/modem (Internal) DMD3442 **\$159.99**
(External) DMD3441 **\$179.99**

*Price after manufacturer's \$35 mail-in rebate. Price before rebate is \$199.99. Offer expires 4/30/96.
**Price after manufacturer's \$35 mail-in rebate. Price before rebate is \$219.99. Offer expires 4/30/96.

Windows NT Server 4.0

Powerful Network Operating System!

Microsoft

\$50 REBATE!

Windows NT Server 4.0 Version Upgrade w/5 client licenses

\$299.95!
UP4007

*Price after manufacturer's \$50 mail-in rebate. Price before rebate is \$349.95. Offer expires 5/31/96. Limit 1 rebate per customer. To receive rebate ask for AD006.

Novell IntranetWare

IntranetWare lets you access and publish information on intranets and the Internet with a high-performance Web server, browser, and Web-site authoring tools!

Novell.

FREE! NETWARE UTILITIES!

IntranetWare 5 User Upgrade from any 5 User DCS3226 **\$349.99**
NetWare Operating Systems IntranetWare 5 User DCS3217 **\$729.99**
IntranetWare 10 User DCS3219 **\$1429.99**

*When you buy IntranetWare, what happens next? Matters may vary. Free software shipped in promotional packaging. Software files are time-limited versions. Ask for item #12047602.

ETHERNET CARDS	
DEC3199 Addon PNP Combo Adapter	\$17.99
DEC2673 Allied Telesis 10BT PNP ISA	\$19.99
DEC1474 3Com Etherlink III 10BT ISA	\$59.95
DEC1474 3Com Etherlink III 10BT ISA Spk.	\$269.95
DEC2425 3Com Etherlink III 10BT 10BT2 ISA	\$69.95
DEC1941 Intel Pro/10+ 10BT PNP ISA	\$56.99
DEC1942 Intel Pro/10+ PNP 10BT ISA 5 Pack	\$259.99
DEC1941 Kingston EtherB 10BT PNP ISA	\$24.99
DEC2955 SMC EZ 10Base T PNP ISA	\$24.99
DEC2961 SMC EZ 10Base T PNP PCI	\$24.99
DEC2572 Dataln 10BT PCI Card (Mac/PC)	\$49.95
DEC3002 Samsung 10Base T PNP ISA	\$17.99

FAST ETHERNET ADAPTERS	
DEC3165 3Com Etherlink XL 10/100 PCI Card	\$89.95
DEC3168 3Com Etherlink XL 10/100 PCI Cards 5-pk	\$399.99
DEC2968 Intel 10/100+ PCI	\$79.95
DEC3010 Intel 10/100+ PCI 5 Pack	\$369.95
DEC2454 Netgear 10/100 PCI adapter	\$39.99
BND2551 Addon 10/100TX PCI	\$27.99
DEC2255 Kingston 10/100 PCI	\$49.99
DEC2659 SMC 10/100 PCI	\$69.99
DEC2543 Asante 10/100 PCI	\$49.99
DEC1926 Linksys 10/100 PCI	\$39.99

*Price after \$10 manufacturer's mail-in rebate. Price before rebate is \$37.99. Offer expires 4/30/96.

ETHERNET HUBS	
BND2955 Addon 4 Port 10Base T	\$44.99
DEH2137 Addon 8 Port 10Base T w/BNC	\$64.95
DEH1621 Addon 8 Port w/BNC-AUI	\$79.99
DEH2051 Allied 4 port 10T Hub	\$49.99
DEH2050 Allied 8 Port 10T Hub	\$56.99
DEH1486 Allied 16 port 10T w/BNC & AUI	\$199.95
DEH1487 Allied 24 Port 10BT w/BNC & AUI	\$259.95
DEH2384 Asante 5 Port 10BT Hub	\$49.99
DEH2383 Asante 8 Port 10BT Hub	\$59.99
DEH1310 Asante 8 Port w/BNC & AUI	\$99.99
DEH1681 Netgear 8 Port Hub 10BT Hub w/BNC	\$54.99
DEH1647 Netgear 8 Port Hub w/Internal Power	\$89.95
DEH1682 Netgear 16 Port 10BT w/BNC & AUI	\$149.99
DEH1600 SMC EZ Hub 16 Port w/AUI & BNC	\$159.99
DEH2289 3Com OfficeConnect TPA 4 10BT	\$59.95
DEH1721 3Com OfficeConnect BTPO 8 10BT	\$84.99
DEH2287 3Com OfficeConnect TP/BC 16 10BT	\$199.99

*Price after manufacturer's \$10 mail-in rebate. Price before rebate is \$54.95. Offer expires 4/30/96.

FAST ETHERNET HUBS	
BND1988 Netgear 16 Port 100 Base TX Hub	\$69.99
BND2596 Netgear 4 Port 100 BTX Hub	\$94.99
BND2595 Netgear 8 Port 100 BTX Hub	\$184.99**
DEH3374 D-Link 4 Port 10/100 Hub	\$99.99
DEH3553 Linksys 5 port 100BTX hub	\$99.99
DEH2547 Intel 10/100 Stackable 24 Port Hub	\$1379.99
DEH3225 3Com Office Connect Hub TP800	\$359.99
DEH3226 3Com Office Connect Hub TP1200	\$509.99
DEH3227 3Com Office Connect Hub TP400	\$199.99
DEH3480 3Com Superstack 8 Auto 10/100 24 Port	\$1299.99
DEH3481 3Com Superstack 8 Auto 10/100 12 Port	\$869.99

*Price after manufacturer's \$35 mail-in rebate. Price before rebate is \$129.99. Offer expires 4/30/96.
**Price after manufacturer's \$35 mail-in rebate. Price before rebate is \$219.99. Offer expires 4/30/96.

PC CARDS	
DEC2554 3Com Etherlink III 10BT PCMCIA	\$129.99
DEC2548 3Com Etherlink III 10BT 10BT2 PCMCIA	\$169.95
DEC2942 3Com Fast Etherlink III 10/100 168t PCMCIA	\$149.99
DEC2942 3Com Fast Etherlink III 10BT 168t PCMCIA	\$259.95
DMD3427 3Com 10/100 LAN + 56K Modem PC Card	\$339.99
DMD3426 3Com 10Mbps LAN + 56K Modem PC Card	\$264.99
DEC2589 3Com 10/100 PCMCIA	\$149.99
DMD2608 Xarcum 10/100 Lan/56K Modem PCMCIA	\$329.99
DEC3045 Intel 10/100 Lan/56K Modem PCMCIA	\$269.99**
DEC1325 Linksys 10BT 10BT2 PCMCIA	\$69.99
DMD2529 Accura 56K PC Card	\$144.99
DMD2531 Accura 33.6 PC Card	\$99.99

*After manufacturer's \$50 mail-in rebate. Offer valid 4/1/96-5/31/96.
**After manufacturer's \$40 mail-in rebate. Offer valid 10/1/97-5/30/98.

MODEMS	
DMD3442 USR 56K Fax/modem* Internal	\$159.99
DMD3441 USR 56K Fax/modem* External	\$179.99
DMD3448 USR 56K Fax/modem* External Mac-V.90	\$179.99
DMD3443 USR 56K Winmodem Internal-V.90	\$99.99
DMD3470 USR 56K Voice Fax/modem Internal-V.90	\$179.99
DMD3469 USR 56K Voice Fax/modem Pro External-V.90	\$249.99
DMD2525 Hayes Accura 56K* Internal	\$94.99
DMD2526 Hayes Accura 56K* External	\$114.99
DMD2441 Hayes Accura 33.6 Internal	\$49.99
DMD2440 Hayes Accura 33.6 External	\$79.99
DMD2778 Bdsunr Pro EZ - External	\$285.95
DMD2121 3 Com Impact IQ ISDN Modem	\$199.99
DMD1642 USR Sportster ISDN 128	\$199.95
DMD1705 USR Courier I Ext	\$279.99

*After manufacturer's \$80 mail-in rebate. Offer valid 1/1/96-4/30/96.
**See standard computer upgrade at 50% off. Due to FCC regulations, download speeds are limited to 53Kbps. Actual speeds may vary.

SWITCHES	
DEH3468 3Com Switch 1100 12 Port 10BT	\$1019.99
DEH3469 3Com Switch 1100 24 Port 10BT	\$1359.99
DEH2740 3Com Switch 3000 Auto 10/100 12 Port	\$1569.99
DEH3533 3Com Switch 3300 Auto 10/100 24 Port	\$2869.99
DEH2361 3Com Desktop Switch 24 Port	\$1219.99

DEH3368 Asante Friendlynet 810BT 210/100	\$299.99
DEH2554 Baystack 350T 16 Port 10/100	\$1879.99
DEH2553 Baystack 350T 14 Port 10/100	\$2259.99
DEH2630 Netgear FS104 4 Port Auto 10/100	\$439.99
DMD2667 Netgear SWS10 10 Port	\$519.99**
BND2671 Netgear SWS18 18 Port w/FREE HUB	\$819.99
DEH3391 Cisco Catalyst 1924 24 Port 2100TX	\$1499.00
DMD2598 AdvantechStack 20BT w/FREE HUB	\$719.99*
DEH3341 Intel 510T 24 port 10/100 switch	\$2799.99

*While promotional supplies last.
**After mfr \$50 mail-in rebate. *Offer valid 3/23/96-5/30/96.

REMOTE ACCESS	
DEB1950 Netgear RT328 ISDN Router	\$319.99
DEB1602 Cisco 2501 Ethernet dual serial Router	\$1739.99
DEB1609 Cisco 2514 2501 Dual Serial Router	\$2049.00
DEB1391 Ascend Pipeline 750U ISDN Router w/2 Analog	\$639.99
DMD1286 Ascend Pipeline 500U ISDN Router	\$569.99
DEB1168 Ascend Pipeline 130 (T1 CSU, ISDN BRI)	\$1299.99
DEB1652 Web Ramp M3 3 Port Analog Router	\$329.95*
DEB1140 Fantron Netopia 12 User ISDN Router	\$599.00
DMD2912 Adtran TSU LT T1 CSU/DSU	\$669.00
DMD2875 Shiva Lan Rover/E 5.0 4 Port Async RAS	\$1279.00

*While promotional supplies last.

MEDIA CONVERTERS/TRANSCIVERS	
DIC1462 Transcon 10BT, 10BT, converter	\$199.99
DIC1031 Transcon 10BT to 10BT2 converter	\$119.99
DIC1456 Transcon 100BTX/MM Fiber ST	\$459.99
DIC1357 Lantron 10BT to 10BTFL converter	\$199.99
DET1469 ATI Micro Transceiver (10BTFL/ST)	\$149.99
DET1524 ATI Suntime Transceiver 10Base-2	\$24.95
DET1523 ATI Suntime Transceiver 10Base-T	\$24.95

PRINT SERVERS	
DEP1579 HP JetDirect 150X	\$169.95
DEP1580 HP JetDirect 10/100 Card	\$399.95
DEP1233 HP JetDirect EX Plus	\$239.99
DEP1492 HP JetDirect Card 10BT	\$309.95
DEP1152 HP JetDirect EX Plus 3	\$349.99
DEP1490 HP JetDirect 10T/10BT/2T	\$359.95
DEP1584 AXIS150 Print Server Dual Port Multiprotocol	\$159.99
BND2569 AXIS 540 Print Server Multiprotocol	\$99.99*
DEP1444 Net print 500E/M	\$109.99

DEP1674 JetDirect 300X 10/100	\$259.99
DEP1493 Intel NetPortExpress Pro 10/100 3 Port	\$369.95
DEP1531 Intel NetPortExpress Pro 10/100 1 Port	\$259.95

*Price after manufacturer's \$50 mail-in rebate. Price before rebate is \$149.99. Offer valid 3/1/96-4/30/96.

POWER PROTECTION	
DUP1159 BackUPS 200	\$79.99
DUP1160 BackUPS 280	\$89.99
DUP1017 BackUPS 400	\$129.99
DUP1016 BackUPS 450	\$159.99
DUP1018 BackUPS 600	\$219.99
DUP1647 BackUPS Pro PnP 280	\$135.99
DUP1252 BackUPS Pro PnP 420	\$219.99
DUP1253 BackUPS Pro PnP 650	\$265.99
DUP1714 SmartUPS 700 w/ Power Chute	\$389.99
DUP1715 SmartUPS 1000 w/ Power Chute	\$479.99
DUP1717 SmartUPS 1400 w/ Power Chute	\$629.95
DSP1162 Personal 7 Surge	\$18.99
DSP1161 Personal 7 w/Tel	\$24.99
DSP1137 Pro 7 Surge	\$29.99
DSP1090 Network 7 Surge	\$32.99
DSP1488 Surge Station Pro 8	\$32.99
DSP1482 Surge Station Pro 6 Tel	\$39.99

CABLES	
DCA2227 Cat 5 Patch Cables Available in 9 Colors and 11 Lengths! 10Base-T Ethernet	from \$4.99
OBC1135 Cat 5 Bulk - 4 pr PVC 1000 ft	\$119.99
OBC1060 Cat 5 Bulk - 4 pr Plenum 1000 ft	\$299.99
DON0331 Category 5 Install Kit w/Bulk Cable Plugs, Tools & Testers	\$279.99
DCD1448 Cat 5 RJ45 Plugs 50pk	\$49.99
OPA1512 Cat 5 Patch Panel T568B 24 port	\$115.99
OTO1089 PunchDown Tool 110 Style	\$49.99
OTO1030 Modular Crimp Tool	\$49.99
OTK1049 Category 5 Termination Kit	\$179.99
DCD1916W1 Cat 5 Keystone Jack T568B	\$4.69
DWP1362 Wall Plate, single port	\$2.29
DCA1282 FiberPatch Cable ST-ST Duplex, 1 m	\$39.99
DT5134S Penta 350 w/ 2 Way - Injector	\$3995.00
OTS1439 Fluke 620 CableMeter	\$699.00
OTS1353 MicroScanner	\$359.99
OTS1487 Progressive Tone & Probe Tester Kit	\$99.99
OTS1563 Multi Network Cable Tester II	\$79.99

Data Comm WAREHOUSE

To order, call toll-free 24 hours a day, 7 days a week

1-800-689-8663

www.warehouse.com Fax: 732-363-4823

Order until 12:00 midnight (E) weekdays for overnight delivery of "in stock" items only \$9.95!

*Shipping charge \$9.95 per order up to 7lbs. plus an additional \$1.25 per lb. over 7lbs.



WANT TO NETWORK **ALL** YOUR PERIPHERALS? THINK THINSERVER™

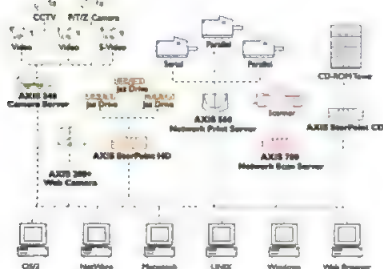


**PERIPHERAL SHARING MADE SIMPLE, EASY AND AFFORDABLE.
ONLY FROM AXIS.**

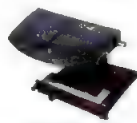
Think print servers are a good idea for your network? You should see what Axis Communications is up to now.

Using ThinServer Technology, our complete line of products makes it easy and affordable to connect your peripherals to any size LAN, from the workgroup to the enterprise. Put live pictures on the Web and intranets for monitoring and security with our Internet camera servers. Access CD-ROMs across your enterprise with our AXIS StorPoint™ CD. Share Iomega® Jaz® drives with our

AXIS StorPoint HD/4 Jaz tower. Scan and send paper documents over the network instead of faxing or mailing with our AXIS 700 Network Scan Server. And more ThinServer peripheral products are on the way — including the latest advances in network print servers.



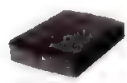
Camera Servers



Print Servers



Scan Server



CD-ROM Servers



Storage Servers

ThinServer Technology includes "thin" versions of the most popular network operating systems, Web management tools and Axis' own ETRAX 32-bit RISC processor — based on open architecture, streamlined and optimized for device connectivity independent of any file servers. So you keep network traffic to a minimum and offload your file servers.

YEAR 2000-COMPLIANT

It's an idea whose time has come. It's revolutionizing the way users access peripherals over the network. And it's only from Axis Communications.

Free White Paper! To receive a free White Paper on ThinServer Technology, visit our Web site at www.axis.com or call us at 800-444-AXIS. And see how peripheral servers from Axis can make your network smarter.

WHAT IS THINSERVER TECHNOLOGY?

It's a breakthrough technology that makes peripherals of all kinds "network ready".

Access everything from printers and storage systems to digital cameras, CD-ROM drives and scanners — with no intermediate PC client or server. Your peripherals work faster and smarter.

Everything is plug-and-play!

AXIS
COMMUNICATIONS

ACCESS EVERYTHING WITH THINSERVER TECHNOLOGY

Axis is a registered trademark, and StorPoint and ThinServer are trademarks of Axis Communications AB. All other company names and products are trademarks or registered trademarks of their respective companies. GSA pricing available. Call for more information.

Choose 355 at www.pcmag.com/infolink

Net Tools

INTERNET TOOLS



SECURE SOCKETS LAYER (SSL) 3.0

For Whose Eyes Only?

By Jeff Downey

If your job involves even infrequent use of the Internet, you'll eventually need to deal with secure-transaction issues. Basic security starts with Secure Sockets Layer (SSL), a protocol developed by Netscape for a software layer that sits between an application such as your browser and a reliable transport mechanism such as your TCP/IP stack.

Now in Version 3.0, SSL defines an interface in which a client and a server can perform data encryption, assure message integrity, and validate user authentication. These functions are vital for situations in which confidentiality is a must.

THE THREE GOALS

Secure transactions across the Internet, as with any other medium, have three goals. First, two parties engaging in a transaction, such as the exchange of e-mail, a business transaction, or some other data transfer, don't want a third party

to be able to read their transmission. Some form of *data encryption* is needed.

Second, the receiver of a message should be able to detect whether someone has tampered with the message in transit. This calls for a *message integrity* scheme. Finally, both parties

must know that they are communicating with the real McCoy, not an impostor. This is done with *user authentication*.

There are several popular data encryption methods, among them DES, RC2, and RC4. Whatever the method, the aim is the same: to take meaningful data and temporarily turn it into gibberish. An eavesdropper will not be able to take this gibberish and turn it back into meaningful data, but the receiver can.

Data encryption methods in use today rely on a technique called *public-key cryptography*. Everyone using a public-key system has a public key and a private key. Messages are encrypted and decrypted with the keys. A message encrypted with your public key can be decrypted only with your private key.

For the system to work, two parties engaging in a secure transaction must know each other's public keys. Private keys, however, are closely guarded secrets known only to their owners. When I want to send you an encrypted message, I use your public key to turn my message into gibberish. I know that only you can turn the gibberish back into the original message, because only you know your private key.

Public-key cryptography also works in reverse. That is, only your public key can decipher your private key's encryption.

MESSAGE DIGESTION

To make a message tamper-proof (creating message integrity), the sender runs each message through a *message-digest* function such as MD5 or SHA. This function within an application produces a number called a *message authentication code* (MAC). The system works because it's almost impossible for an altered message to have the same MAC as another message. Also, you can't take a MAC and turn it back into the original message.

The software being used for a given exchange produces a MAC for a message before it is encrypted. Next, it encrypts the MAC with the sender's private key. It then encrypts both the message and the encrypted MAC with the recipient's public key and sends the message.

The process at the receiving end takes longer to explain than to do. When I get your message and decrypt it, I also get the encrypted MAC. My software takes the message and runs it through the same message-digest function that you used to get my MAC. Then it decrypts your encrypted MAC. If my MAC and your decrypted MAC are the same, then I know the message has not been tampered with.

A problem arises when you want to send encrypted e-mail to people you don't know. How do you know that the public key be-

Deciphering the Cipher Suite

Every Web-server program supports a subset of recognizable *cipher suites*, which define how sender and recipient will exchange data. Below is a breakdown of terms constituting the typical suite, see the diagram "Anatomy of a Cipher Suite" for a sample.

Popular SSL key-exchange methods	DH, DHE	Nonproprietary key-exchange methods developed by Whitfield Diffie and Martin Hellman, the inventors of public-key cryptography.
	RSA	A proprietary key exchange developed by RSA Data Security.
Popular SSL digital-certificate types	DSS	A certificate is signed using the nonproprietary Digital Signature Standard approved by the National Institute of Standards and Technology in 1994
	RSA	A certificate is signed using proprietary RSA Data Security technology.
Popular SSL-supported encryption methods	DES, DES40, and 3DES	Nonproprietary encryption methods specified by the Data Encryption Standard of the National Institute of Standards and Technology. DES has four modes of operation: CBC, CFB, ECB, and OFB.
	RC2_CBC_40, RC4_128, and RC4_40	Proprietary encryption methods developed by RSA Data Security. RC2_CBC_40 and RC4_40 are legally exportable.
	MD5 and SHA	MD5 and SHA are the only message-digest functions supported in SSL 3.0

longs to the proper person?

Although there is no universal answer to this question, different systems have come up with different solutions. A popular public-key software package used for data security is PGP, for *Pretty Good Privacy* (www.pgpi.com). One PGP solution is called the

believes it to be legitimate. If the client trusts the issuer, then it can trust the server.

The digital-certificate issuer "signs" the certificate by generating a MAC for it, then encrypting the MAC with the issuer's private key. If the client trusts the issuer, then the client already

Anatomy of a Cipher Suite



web of trust, in which you have a virtual key ring of public keys, typically stored on-disk, that you have physically verified.

If I want to add your public key to my key ring, I must verify your identity. But if I trust everyone that you trust, then I can add your entire key ring to my key ring. Another way PGP users exchange keys is through public-key servers.

REENTER SSL

The dynamics of the Web dictate that another user-authentication system must exist, because if I want to buy merchandise from your Web site securely, I may not have time to hunt down and verify your public key. I need an automated solution that performs user authentication. SSL 3.0 provides such a solution by using digital certificates.

Using SSL, a client program and a server program agree on encryption and MAC methods. The server authenticates itself to the client by sending an unencrypted ASCII-based digital certificate (authentication of the client is optional). A digital certificate contains information about the company operating the server—including the server's public key. The digital certificate is "signed" by a trusted digital-certificate issuer, which means, in essence, that the issuer has investigated the company operating the server and be-

knows the issuer's public key.

Popular certificate issuers include RSA and Verisign, whose services are not free. Currently, there are only a handful of issuers. But you can issue certificates for your internal intranet users and applications by using what is known as a *certificate server*. Netscape sells a separate certi-

cate server software package; IBM/Lotus and Microsoft integrate a certificate server with their Web server software.

Besides agreeing on an encryption and MAC scheme, client and server have to agree on a key-exchange method: To close security holes, SSL 3.0 requires that the client and server agree on a set of randomly generated keys. After the session is terminated, the keys are thrown away.

The pragmatic issues of implementing Web security can get bumpy. For instance, SSL 3.0 defines several key-exchange methods. Microsoft IIS 4.0 and Netscape Enterprise Server 3.0, however, implement only the RSA key-exchange method patented by RSA Data Security. So if you're going to write commercial software that uses SSL 3.0 to commu-

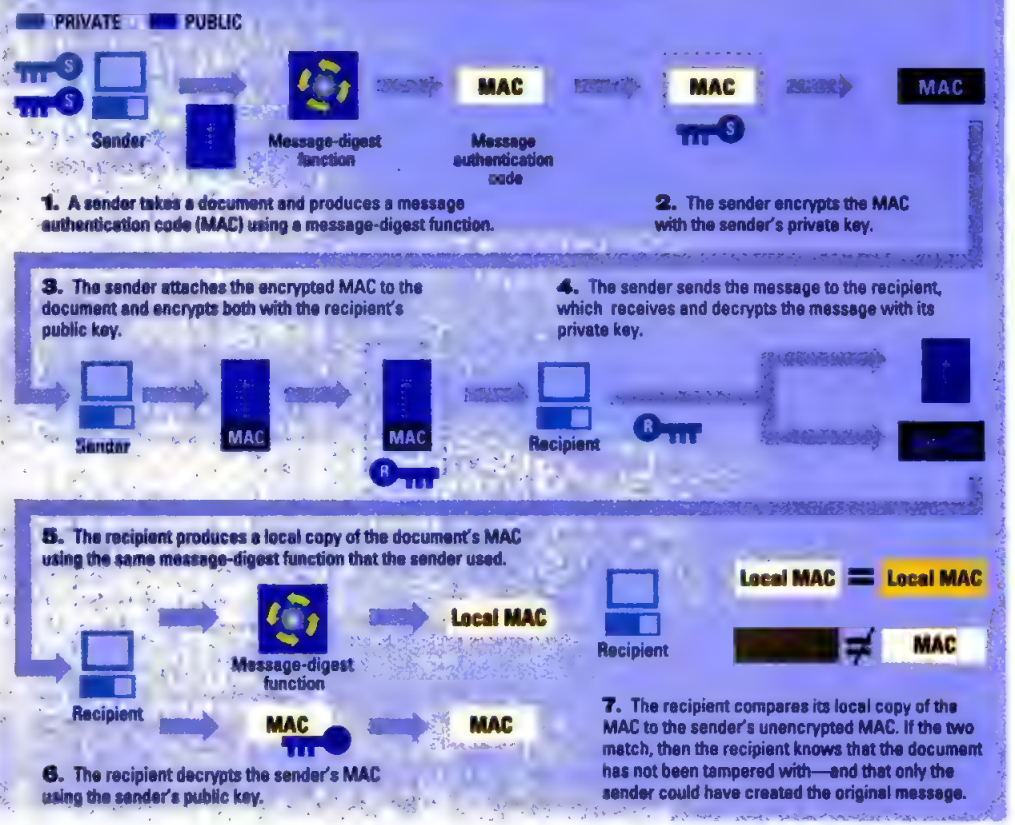
nicate with these Web servers, you may have to pay royalty-based licensing fees to RSA.

DE FACTO STANDARD

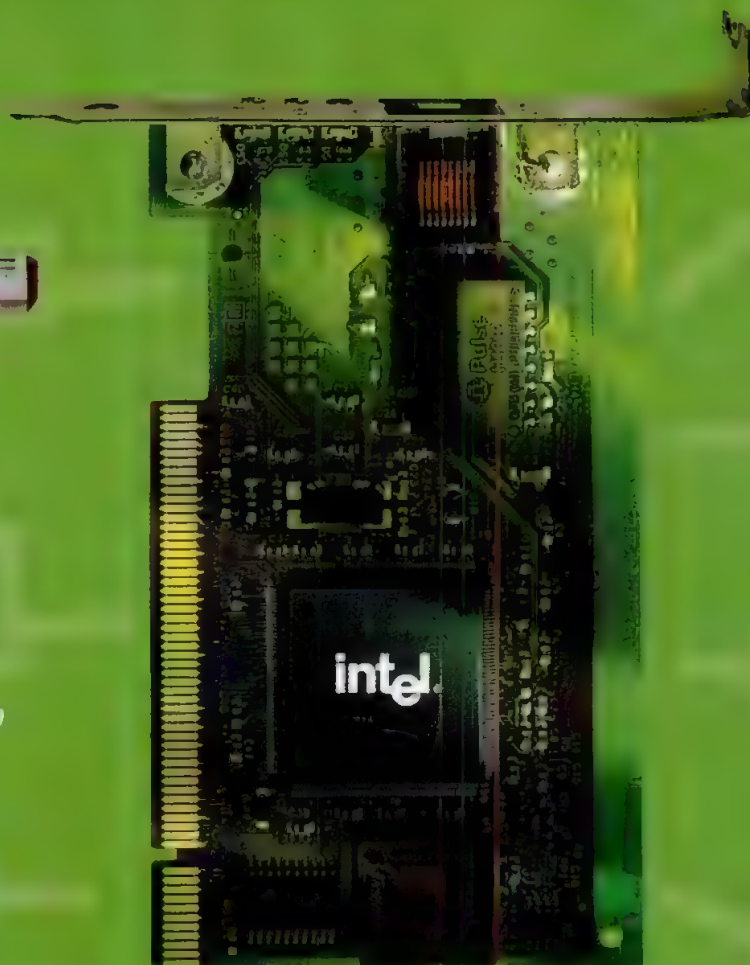
Despite what you may think of SSL, it's probably here to stay. SSL is already a de facto standard for secure transactions and other exchanges over the Web, and the Internet Engineering Task Force (IETF) is currently trying to use SSL 3.0 as a basis for a proposed open standard called Transport Layer Security. What's more, most major Web server vendors—including C2NET, IBM/Lotus, Microsoft, Netscape, Novonyx, and O'Reilly—support it.

The dynamics of secure transactions will continue to evolve. New standards will be defined. Export laws will change. But the three basic tenets that make up a secure transaction will remain the same. If you understand the basics, you're already three steps ahead of everyone else. **PG**

How to Send a Secure Document



One way to judge an adapter is
by the people who use it.



FasterSimpler
NETWORKS

Top PC manufacturers demand quality when building their PCs and servers. That's why they trust the performance, manageability and compatibility they get from Intel network-
ing connections. [▶ www.intel.com/network/connections/](http://www.intel.com/network/connections/)

intel.

CDW®

YOUR TOTAL NETWORKING SOLUTION!

3Com® OfficeConnect™

3Com's OfficeConnect™ product line makes it simple for small offices to improve productivity by networking their computer resources. A choice of OfficeConnect hubs provides central connections for up to sixteen computers.



Hub4/TP 4 RJ-45 ports	\$59.47	CDW 82295
Hub4/TP combo 4 RJ-45 ports, AUI and BNC	\$78.49	CDW 82298
Hub8/TPO 8 RJ-45 ports	\$78.49	CDW 66411
Hub8/TPC 8 RJ-45 ports, 1 BNC port	\$114.95	CDW 66409
Hub8/TPM 8 RJ-45 ports, SNMP management	\$329.46	CDW 66410
Hub/TP16C 16 RJ-45 ports, AUI	\$199.31	CDW 82299
ISDN LAN Modem	\$386.86	CDW 96687
Hub TP400 4-port Fast Ethernet hub	\$197.47	CDW 100896
Hub TP800 8-port Fast Ethernet hub	\$349.14	CDW 100895
Hub TP1200 12-port Fast Ethernet hub	\$499.57	CDW 100894

Fast EtherLink XL and EtherLink XL

Network interface cards

- ◆ Parallel Tasking PACE Interactive Access technology for unsurpassed throughput and low CPU utilization
- ◆ Dynamic Access features—including PACE Interactive technology, PACE real-time applications support, free PictureTel™ data conferencing software
- ◆ Optional Transcend® network management—transform NICs from passive network devices to active network components
- ◆ Free DynamicAccess software upgrades, including dRMON (distributed RMON)
- ◆ Lifetime warranty



CDW Best Seller!

3C905-TX Fast EtherLink XL PCI	\$88.46	CDW 71029
3C900-TPO EtherLink XL PCI 10BASE-T	\$109.16	CDW 71037
3C900-COMBO Ethernet XL PCI combo	\$129.25	CDW 71038
3C597-TX Fast EtherLink XL EISA	\$235.07	CDW 56937
3C905-T4 Fast EtherLink XL PCI	\$129.69	CDW 87669

Microsoft®

BackOffice Server V4.0

Microsoft BackOffice V4.0 is one of the only comprehensive and integrated suites of server applications designed for your corporate network, intranet and the Internet. Built on Windows NT Server, it includes seven best-of-breed server products in one integrated information system. BackOffice V4.0 gives you more choices at a lower cost for working on your

company's corporate network and intranet, as well as on the Internet.

Includes: Microsoft NT® Server V4.0, Windows NT Server V4.0 Option Pack (including Internet Information Server V4.0, Microsoft Transaction Server and Microsoft Message Queue Server), FrontPage 98, SQL Server V6.5, Exchange Server V5.5, Site Server V2.0, SNA Server V4.0, Systems Management Server V1.2, Proxy Server V2.0, integrated setup and administration, and intranet starter kit.

Full version	\$2229.26	CDW 103492
Version upgrade, CD	\$787.73	CDW 103493
Competitive upgrade, CD	\$1825.38	CDW 103494
5-client access licenses	\$1169.16	CDW 103495
20-client access licenses	\$3699.46	CDW 103496

800-917-4239



Seagate Software

Seagate Backup Exec™ for Windows NT V7.0

Backup Exec is the system of choice for high performance, reliable Windows NT data protection, and the most comprehensive solution for 100% BackOffice compatibility. As the first backup solution designed for Windows NT, Backup Exec incorporates the Windows NT APIs for superior 32-bit performance and ease-of-use.

Single-server edition	\$428.17	CDW 94889
Enterprise edition	\$789.88	CDW 94890



Seagate Backup Exec™ Small Business Server Suite For Windows NT V7.0

Full integration, power and 100% compatibility combine to make Seagate Backup Exec Small Business Server Suite™ one of the most advanced management tools for complete data protection. Backup, data restoration, virus protection and disaster recovery automatically work together to completely protect your server and your business.

Version upgrade	\$239.38	CDW 108303
Full version	\$449.88	CDW 108818

*Requires Microsoft BackOffice Small Business Server operating system

COMPAQ



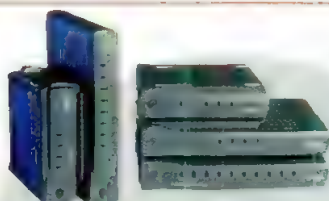
ProLiant 800 and 850R Series

The Internet and new applications are placing unparalleled demands on your servers. Your challenge: find an affordable workgroup server that not only powers your applications today, but anticipates your needs for tomorrow. At a price you won't believe for next-generation technology, the Compaq ProLiant 800 and 850R Series unlock ideal workgroup performance. And with Compaq manageability and reliability, these servers will consistently save you time and money down the road.

ProLiant 800 and 850R Series

CPU	RAM	Hard drive	CD-ROM	Ethernet	Price	CDW
200MHz Pentium Pro	32MB	—	8X	10BASE-T	\$2159.00	81759
200MHz Pentium Pro	32MB	4.3GB	8X	10BASE-T	\$2825.00	81760
200MHz Pentium Pro*	32MB	32MB	8X	10/100	\$3068.00	89061
200MHz Pentium Pro**	32MB	32MB	8X	10/100	\$3295.00	96899

*Rack model **Hot plug rack model



intel

Intel InBusiness small business networking products

Intel InBusiness™ networking products are designed so you can easily create or expand your own small network in minutes. The Intel InBusiness line includes hubs, bridges and routers.

- ◆ Ideal for small networks and workgroups ◆ SureStack™ design allows you to connect products in one convenient stack, horizontally or vertically ◆ CableKeeper cable management system "hooks" cables out of the way, eliminating the confusing mess of cables ◆ Easy to install ◆ Low-cost, high-performance networking solutions

5-port Ethernet hub	\$59.93	CDW 104690
8-port Ethernet hub	\$82.02	CDW 104692
4-port Fast Ethernet hub	\$187.13	CDW 104695
8-port Fast Ethernet hub	\$345.46	CDW 104697
8-port Fast Ethernet hub Plus (one 10/100 port)	\$448.07	CDW 104698
8-port switch	\$466.99	CDW 104699
8-port switch Plus (two 10/100 ports)	\$676.14	CDW 104700
Intel InBusiness Internet Station	\$375.10	CDW 104701

CDW® offers competitive business equipment leases!

Call your CDW® account manager for details!

IBM

Business Partner

Netfinity 3500 Series

IBM Netfinity 3500 Series reflects IBM's continuing commitment to small businesses and company departments. Intel Pentium® II processors provide the power required for high performance file and print serving, while Netfinity Manager lowers the total cost of ownership by offering features like asset and capacity management. Netfinity 3500 also plans your business for future growth by offering 2-way Symmetrical Multiprocessing (SMP) and a maximum of 22GB of internal storage capacity.



IBM Netfinity 3500 Series

CPU	RAM	Hard drive	CD-ROM	Price	CDW
233MHz Pentium II	32MB ECC	OPEN	24X	\$2297.36	106991
266MHz Pentium II	64MB ECC	OPEN	24X	\$2797.85	106993
266MHz Pentium II	64MB ECC	4.3GB	24X	\$3185.78	106994
333MHz Pentium II	64MB ECC	OPEN	24X	\$3336.27	106995

Quantum

BellStor external SCSI hard disk drives

The BellStor family of single drive subsystems from Quantum provides up to 9.1GB of formatted capacity. For enhanced reliability, the Quantum Fireball SE, Atlas II and Viking use an advanced Reed Solomon implementation to detect and correct double-burst errors on the fly.



Quantum External SCSI Hard Drives From BellStor

Model	Capacity	Interface	Transfer Rate	Data Buffer	Price	CDW
Fireball SE	2.1GB	Ultra SCSI	20MBps	128KB	\$309.93	109217
Viking	2.2GB	Ultra SCSI	20MBps	512KB	\$338.27	109237
Viking	2.2GB	Ultra SCSI-3	40MBps	512KB	\$369.23	109238
Fireball SE	3.2GB	Ultra SCSI	20MBps	128KB	\$339.91	109222
Fireball SE	4.3GB	Ultra SCSI	20MBps	128KB	\$394.68	109226
Viking	4.5GB	Ultra SCSI	20MBps	512KB	\$459.98	109239
Viking	4.5GB	Ultra SCSI-3	40MBps	512KB	\$497.90	109240
Atlas II	4.5GB	Ultra SCSI	20MBps	512KB	\$609.93	109241
Atlas II	4.5GB	Ultra SCSI-3	40MBps	512KB	\$646.41	109242
Fireball SE	6.4GB	Ultra SCSI	20MBps	128KB	\$487.76	109228
Fireball SE	8.4GB	Ultra SCSI	20MBps	128KB	\$599.68	109230
Atlas II	9.1GB	Ultra SCSI	20MBps	1,024KB	\$935.35	109243
Atlas II	9.1GB	Ultra SCSI-3	40MBps	1,024KB	\$969.70	109244



COMPUTER DISCOUNT WAREHOUSE

The right price. The right advice.

800-917-4239 www.cdw.com

©1998 CDW Computer Centers, Inc. 1208 N. Milwaukee Avenue, Rosemont, IL 60018 PCW 860106-12081018

Choose 133 at www.pcmag.com/infolink

Is This What Your Customer Looks Like?

Symantec Helps You Focus On Your Customer.

As a small business owner, you know that keeping your customer in focus is critical to your success. That's why you need Symantec Small Business Software. Symantec has a line of products for small businesses like yours that will help you be more productive and stay well protected. And that means more time in front of your customer and less time in front of your computer. Which is exactly the way it should be.



CALL 1-800-835-6222 EXT. 93127 TO ORDER YOUR FREE 30-DAY TRIAL CD!

SYMANTEC

Plug. Play. Perform.

with the QMS® 2060 Business Print Systems



QMS 2060 BX

Easy on the Network.

The QMS 2060 BX is the perfect network laser printer for Windows®, Macintosh®, and UNIX.

- ◆ Built-in Ethernet and parallel interfaces
- ◆ Standard PostScript® and PCL® 5e emulations
- ◆ Up to 1200 x 1200 dpi
- ◆ Powerful 100 MHz processor
- ◆ Job spooling
- ◆ MOPY—multiple original prints
- ◆ QMS CrownAdmin® 3 state-of-the-art printer management tools

QMS 2060 WX

Easy on Windows® Users.

The QMS 2060 WX is the perfect laser for Windows workgroups.



- ◆ Standard Ethernet and parallel interfaces
- ◆ Designed for the world's most popular operating systems, Windows 95 and Windows NT
- ◆ 600 x 600 dpi
- ◆ Two-sided printing option saves paper

Easy on the Pocketbook.

Get the QMS 2060 BX for \$1,999 or the QMS 2060 WX for \$1,699.

Make it easy on those finance guys for a change.

1-800-523-2696

Ext. 54

www.qms.com/?54



One Magnum Place • Mobile, AL 36618

Choose 024 at www.pcmag.com/infolink

Netscape

starting at
\$1,699

Easy to Use.

The QMS 2060 Business Print Systems—simply plug and play. They're fast, printing up to 20 ppm on page sizes ranging from postcard to 13" x 19" edge-to-edge. The built-in Ethernet® interface gives direct access—even when everyone's printing at the same time.

No need to worry about blowing your budget for the entire fiscal year. QMS Business Print Systems are affordable to purchase and operate. Now your workgroup will be cheering, and so will you!

©1998 QMS, Inc. QMS, the QMS logo, and CrownAdmin are trademarks of QMS, Inc. All other trademarks are the property of their respective companies.

Is Your E-mail Protected Against Viruses?

Is your e-mail protected against viruses?

Is your e-mail protected against viruses?

All Certifications!!!



Maximum Detection!!!



Did you know that your antivirus software probably does not detect viruses in electronic mail?

► <http://www.pandasoftware.com>



► Panda Antivirus Exchange/Outlook is the best solution to keep your e-mail virus-free, and is **compatible with any other desktop antivirus that you already have!** Panda automatically detects and disinfects viruses in e-mail attachments and OLE objects as they arrive, are saved or sent in messages. Panda also checks the Public, Private and Personal folders whenever you want.

► Additionally, Panda Software has gone even further to integrate our exclusive system of **Zero Administration Security (ZAS)** that permits the centralized installation, monitoring and updating of the antivirus protection program throughout your entire PC network.

The Best Product!!!



The Best Services!!!



24 hours - 365 days
Hot Line
day, Sunday

Buy it Now!

Send in this coupon by Fax, mail or contact Panda via e-mail or by telephone.

YES, I would like to receive Panda Antivirus Insurance for MS-Exchange/Outlook.

- | | |
|--|--|
| ☐ 1 License \$ 59 | ☐ 100 Licenses \$ 3,500 |
| ☐ 10 Licenses \$ 560 | ☐ 500 Licenses \$ 14,500 |
| ☐ 25 Licenses \$ 1,050 | |



24 hours - 365 days fighting viruses

Panda Distribution Inc.
580 Washington Street
San Francisco, CA 94111
Tel. (415) 392-5850
Fax (415) 392-6116
E-mail info@pandasoftware.com

International Headquarters
Tel. +34 91 301 30 15

Choose 209 at www.pcmag.com/infolink

Sender's Details

- Contact Name: _____
- Company: _____
- Address: _____
- City: _____ State: _____ Zip Code: _____
- Telephone: _____ E-mail address: _____

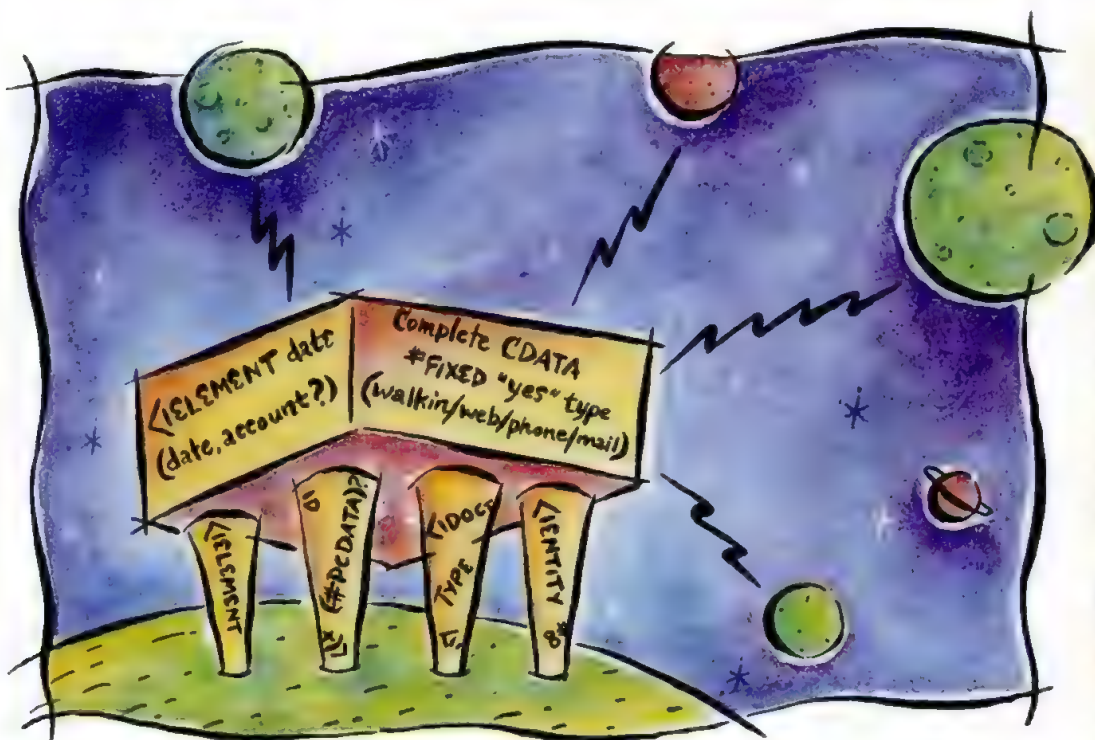
• **Credit Card Payment** • **Make checks payable to Panda Distribution Inc.**

- ☐ VISA ☐ MC ☐ AMEX ☐ DISCOVER
- Credit Card Number: _____ Exp. Date: ____/____/____

• Signature: _____

*Prices are subject to sales tax where applicable and do not include \$15 shipping and handling

PC Tech



Structuring Data with XML

Extensible Markup Language lets developers describe virtually any type of data and deliver it across a network.

By William Robert Stanek

Information and business go hand in hand. Successful businesses know how to leverage the power of their information, and Netsavvy corporations have done just that. They have set up intranets, extranets, and corporate Web sites, all in an effort to help employees and customers tap into the company's knowledge base. Until recently, however, an important ingredient was missing—the ability to describe information and data structures efficiently and consistently over a network. Sure, HTML can be used to format text and multimedia. But HTML isn't very useful when it comes to describing information—you can't really depict something as abstract as a purchase or a customer record. While you could certainly format the data in an HTML table, you can't really describe the indi-

vidual components of the information.

Enter XML, the Extensible Markup Language designed to structure data so that it can be easily transferred over a network and consistently processed by the receiver. Because XML is used to describe information as well as structure it, you can think of XML as a data description language. You can use XML to describe data components, records and other data structures—even complex data structures.

Like HTML, XML is derived from SGML (Standard Generalized Markup Language), but XML is actually a subset of the markup language and includes many of SGML's capabilities. With XML you can define the data structures for your

documents using generalized markup—think of HTML tags and attributes but with more control. Unlike HTML, XML allows you to define

www.pcmag.com/pctech

You'll find all of the articles, examples, and code files in this section at PC Tech Online.

INSIDE

INTERNET TECH: IMAP is an improvement over the POP3 e-mail protocol. It features efficient use of connect time, improved folder management, and support for rules. Find out how this protocol can make your e-mailing experience a better one. *Page 239.*



UTILITIES:

FontViewer is a Windows 95 program that lets you browse through all the fonts on your system, compare selected fonts with one another, and use a variety of filters to find the one that fits your needs. *Page 261.*



PC SOLUTIONS: Starting a group of files simultaneously in Windows 95; getting the Windows 95 Dial-Up Networking feature to redial automatically; restarting Windows 95 in one fell swoop; is it possible to add too much memory to your PC?; getting fancy with graphics in Microsoft Word; calculating hours from starting and ending times; and more. *Page 269.*



your own tags. This single feature frees you from the constraints of predefined tags and lets you structure the data in an XML document any way you like.

As with most Web technologies, the current XML specification is only a starting point. XML version 1.0 describes the core language, specifying how XML documents are to be defined and the grammar that enables documents to comply with this definition. Beyond the core language, two extensions have been proposed: XML Linking and Extensible Stylesheet Language (XSL). The XML Linking proposal defines how to connect XML documents with hypertext links. XSL is proposed as a way to provide rich formatting for XML documents using stylesheets.

As wonderful as XML sounds, it is a fairly new technology and it does have limitations. (For some background, see "XML: A Second Chance for Web Markup" in our November 4, 1997 issue.) XML isn't right for every situation. To help you determine whether XML is right for your project, we'll take a look at the current capabilities of the technology.

XML PROCESSORS

Although XML is designed to work with HTML and SGML, standard browsers and applications cannot interpret XML documents directly. To read an XML document, you need an XML processor, which can be implemented either as a browser or application module. There are two types of XML processors: those that validate documents and those that do not. A validating XML processor checks the structure of documents; a non-validating XML processor doesn't.

Most of the current XML processors are implemented in Java and are designed to be used with Web applications. In such cases, the XML processor is used within the application to extract information from an XML document and display it in an application window. With a Java-based XML processor, the application uses the processor classes to read in the document. Once the application reads in the document, the information in the document is available to Java.

As the use of XML grows, XML processors will be integrated into complete XML document-handling solutions, such as XML browsers. XML processors should also become available as add-ons for Web-based clients, such as Web browsers. When this happens, you will

be able to display XML documents directly in your Web browser. You can find a list of XML processors at the World Wide Web Consortium's Web site (www.w3.org/XML).

XML has a style and complexity similar to a programming language. In the beginning of a

```
<?XML version="1.0" ?>
<xml>
  <customer>
    <accountid> AE4-Robertson </accountid>
    <name>
      <first> Eric </first>
      <mi> H </mi>
      <last> Robertson </last>
    </name>
    <title> VP Sales </title>
    <contact>
      <wphone> 123-555-1212 </wphone>
      <hphone> 123-555-5678 </hphone>
      <email> salesvp@yoyo.com </email>
    </contact>
  </customer>
</xml>
```

FIGURE 1: A well-formed XML document.

program, programmers usually declare parameters that will be used throughout the program. In XML, parameters are similarly defined. You start by setting a *processing instruction* that tells the XML processor which version of XML you are using, like so:

```
<?XML version="1.0" ?>
```

As you can see, processing instructions always begin with `<?` and end with `?>`. Once you tell the processor how to handle the document, you declare a document type, then define the elements associated with the docu-

ment type, which we'll discuss in detail. The document type and the element definitions are officially called a *document type definition* (DTD). Because a DTD can be defined within a document or referenced and accessed externally, a single DTD can apply to one document or many. A validating XML processor can use the DTD to validate a document, that is, to determine if the document conforms to the definitions. If the document complies with the DTD, the document is considered to be valid.

Although necessary for an XML document to be valid, a DTD is not mandatory. When a document lacks a DTD, the XML processor cannot verify that the data structure is sound, but it can still attempt to interpret the data.

In the body of an XML document, data elements are usually entered as pairs of markup tags, such as the begin tag `<CUSTOMER>` and the end tag `</CUSTOMER>`. Although most data elements have a begin tag and an end tag, you can specify elements that have only a single tag. In XML, an element with a single tag is called an empty element.

Empty elements end with `/>` as in:

```
<SPLIT />
```

A document that contains one or more elements is considered to be well formed. Here, all that well formed means is that the document is formed correctly; the processor determines this by examining the number of elements in the document. The main reason the processor checks for elements is to determine if the document has data structures that can be extracted. A document that lacks elements has no data structures; a document with at

least one element has data structures. All XML processors check to see if a document is well formed, but only validating processors check to see if a document is valid.

The document in Figure 1 would be considered well formed

but not valid. The reason for this is that the document does not have a DTD and as a result, the document cannot be said to comply with the DTD. Note that the tags in the document define the structure of the data and not the format. These tags are not predefined. An application would use an XML processor to read in the document. The application is free to format the data as necessary.

ELEMENT OPERATORS

Operator	Context	Description
?	Optional	The element appears once or not at all.
*	Optional and repeatable	The element appears zero or more times.
+	Required and repeatable	The element must appear one or more times.
	Choice	Either element can occur.
..	Sequential	The element must follow another element unless another context descriptor is used as a qualifier.

FIGURE 2: These operators describe how often and in what context elements occur.

ment type. These elements contain keyword assignments for tags and their associated parameters. Assignments follow the basic structure:

```
<!ASSIGNMENT assignment_name
associated_parameter(s)>
```

XML supports five assignment types, DOCTYPE, ELEMENT, ATTLIST, ENTITY, NOTA-



We can synchronize
just about anything.

That's why today's mobile professionals choose Intellisync™ to keep their most important information current, all the time, anywhere. Only Intellisync synchronizes your contacts, calendars, notes and "to-dos" with notebook PCs, PalmPilot organizers, Windows CE devices, Sharp and TI organizers, even the latest smart phones and pagers. And it works with and between the widest range of PIM and groupware applications, including Microsoft Outlook and Schedule +, Lotus Notes and Organizer, Novell GroupWise, Goldmine, Symantec ACT! and more. Plus, our patented DSX™ (Data Synchronization Extensions) Technology ensures unparalleled convenience, accuracy and reliability. So, choose the Intellisync product for your mobile device or Intellisync Gold for enterprise deployment. Today, your data. Tomorrow, water ballet?

To order, or for more information, visit the Puma Technology site at www.pumatech.com/pcm or simply call 1-888-539-4049.



Intellisync™


©1998 Puma Technology, Inc., the Puma Technology logo, Intellisync, the Intellisync logo, and the DSX logo are marks of Puma Technology, Inc. which may be registered in some jurisdictions. All other marks are owned by their respective owners.

puma

Arlington Computer Products...computing solutions since 1984!

Visit Our Website At www.arlingtoncp.com

PC MAGAZINE "...Arlington offers worry-free mail order purchasing!"

PC WORLD "Consistently the lowest prices!"

PC COMPUTING "...Courteous service and terrific technical support!"

**IF YOU SEE A
BETTER PRICE,
CALL FOR A
COMPETITIVE QUOTE!**

Libretto 70CT - Mini-notebook with full-function Windows® 95\$1589
• 120MHz Pentium® MMX chip
Libretto 100CT - 166MHz Pentium® chip and 7.1" active\$2359



Portege 300CT - 3.8 lbs.\$1859
• 133MHz MMX Pentium® chip
Portege 320CT - 3.8 lbs.\$3479
• 266MHz MMX Pentium® chip
• 3.8GB drive

Satellite Pro 440 series with Intel's 133MHz MMX chip, 256Kb SRAM, level 2 cache and 32-bit PCI bus.



440CDX - 12.1" high contrast...\$1319
440CDT - 12.1" active\$1849
• 33.6 cellular voice modem

VALUE

Tecra 510CDT - Pentium® 133MHz chip with 2GB drive and active color\$1389

TOSHIBA

**Toshiba
Authorized
Dealer!**

Satellite Pro 470CDT\$2769

The ideal combination of value and performance, powered by the 200MHz MMX Pentium® processor.
• 2.1GB drive • 12.1" active
• 10X CD-ROM • 32MB RAM
• Built-in 33.6 voice modem

Satellite Pro 480CDT - With features that make it the pro's choice, plus a 233MHz MMX Pentium® chip.....\$3279



• 12.1" active
• 4GB drive
• 32MB RAM
• 10X speed CD-ROM

• 33.6 voice modem
• 256Kb SRAM

Tecra 550CDT - 12.1" active\$3699

A superior value with a 266MHz MMX Pentium® chip.
• 12.1" active @ 1024 x 768
• 3.8GB drive
• 20X CD
• 56Kbps modem



Tecra 730XCDT - 12.1" active...\$1439

Tecra 740CDT - 166MHz Pentium® chip with MMX technology...\$2549
• 13.3" active @ 1024 x 768
• 3.0GB drive • 10X CD-ROM

Tecra 750CDM/DVD\$4599/\$5049
The notebook for the most demanding power user.

• 233MHz Pentium® MMX
• 13.3" active @ 1024 x 768
• 5.1GB drive • 20X CD-ROM

NOTEBOOKS

FUJITSU

Lifebook 635Tx - Pentium® 133-2GB.....\$1829
Lifebook 655Tx - Pentium® 150-TFT\$1829
Lifebook 675Tx - Pentium® 200-TFT.....\$3699
Lifebook 985Tx - Pentium® 233-TFT.....\$4349

HITACHI

VisionBook 4360 - Pentium® 166-TFT...\$1739
VisionBook 7650 - Pentium® 166-TFT...\$2349
VisionBook 7580 - Pentium® 233-TFT...\$3349

NETWORKING

Net 4.11 5/10/25-user...\$649/\$1139/\$1859
Net 4.11 50/100-user\$2349/\$3349
3 Com III 1/5/20-pack\$59/\$259/\$349
3Com Combo 5/20-pack\$489/\$1779
3Com 33.6/Ether.....\$249
3Com 3C900 PCI 1/5-pack\$89/\$399
3Com 3C900 Ether XL 20-pack\$1539
Intel Pro 8220 1/5/20pk.....\$59/\$239/\$849
Intel Pro/100 PCI 1/5/20...\$79/\$299/\$1159
Intel NetPort Pro Int/Ext\$249/\$339

MONITORS

MAG INNOVISION

DX500T/700T/715T...\$309/\$499/\$589
DJ530/700/707\$249/\$459/\$489
DJ717/800/920\$509/\$739/\$1069

PRINCETON

EO400/EO500/EO70...\$159/\$249/\$369
EO72/74/75/76...\$449/\$539/\$609
EO90/710/C2001.....\$669/\$479/\$1219

VIEWSONIC

P8102/G771/P815...\$1099/\$449/\$1259
G773/GT800/G810...\$469/\$1139/\$999

EPSON

PRICE.....PRINT!

LQ570+FX880/2170...\$249/CALL/CALL
LQ870/2070/2170.....\$429/CALL/CALL
DFX5000+/8000\$1369/\$2289
Stylus® Photo.....LOW
Stylus® Color 400/600/800/850...LOW
EPSON Stylus® Color 1520/3000...LOW
EPL 1200/2000.....CALL
Expression Executive/Artist.....LOW
Expression 636 Pro Scanner.....LOW

TOSHIBA Tecra 520 & 530 CDT

Toshiba comes through for customers, as confirmed by its 'A' rating for service and reliability in PC Magazine's Reader's Choice Awards. The Tecra 520CDT and 530CDT put high performance in a whole new light. Weighing a light 6.3 lbs., these sleek notebooks are powered by the Intel® 166MHz Pentium® chip with MMX technology and 32-bit PCI architecture. Both models include:

• 10X CD-ROM • 2.1GB drive • 32MB RAM • Built-in 33.6 cellular modem

Tecra 520CDT

• 12.1" active 800 x 600
• with 4GB drive: \$2679

Tecra 530CDT

• 12.1" active 1024 x 768
• with 4GB drive: \$3019



A Tecra at an incredible value!

Choose 336 at www.pcmag.com/infolink

U.S. Robotics®
The Intelligent Choice in Information Access

Internal...LOW
External...LOW
Voice/int...LOW
Voice/ext...LOW



NEW!— USR 56Kbps V.90 Int/Ext...CALL
• download from the Internet and on-line services at up to 56Kbps—nearly twice as fast as V.34 modems!



3CXEM556T\$249
• Ethernet/56Kbps modem card

FREE SHIPPING ON ALL US ROBOTICS MODEMS

Sportster 33.6 Internal\$89
Sportster 33.6 External\$99
Sportster 33.6 Voice Internal.....\$109
Sportster 33.6 Voice External.....\$139
Sportster 33.6 PCMCIA.....\$159
Courier 56Kbps Internal.....\$209
Courier 56Kbps External.....\$249

Megahertz®

Megahertz is the world leader in PCMCIA modems.

XJ1336 - 33.6 V.34 modem\$169
XJ1560 - 56Kbps PCMCIA\$199
XJ5560 - 56Kbps PCMCIA\$209
XJ4336M-33.6 cellular\$239
CC10BT - 10Base-T\$109
CC10BC - XJACK - Ethernet combo...\$129

**Arlington
Computer
Products, inc.**

Prices and availability subject to change without notice. Qualified purchase orders accepted. No surcharge for charge cards!

851 Commerce Court, Buffalo Grove, IL 60089

HOURS (CENTRAL TIME)

7:30am - 6:30pm / Monday thru Friday

9:00am - 4:00pm / Saturday

Choose 336 at www.pcmag.com/infolink

For orders
& quotes:

800-548-5105

We export!

In Illinois 847-541-6333

Technical Assistance 847-541-6583

WEBSITE www.arlingtoncp.com

FAX 847-541-6881

CREATING AN XML DOCUMENT

Let's say your company accepts orders online and you want to structure those orders as XML documents. To do this, you could build a DTD designed to work with purchase-order transactions. After you define the elements for the DTD, you could use this as a guideline for structuring actual purchase orders with XML.

You build the DTD for the purchase orders within a DOCTYPE assignment. The DOCTYPE assignment creates the most basic element in an XML document, the document type element. Because the document type element is a container for all other elements, the DOCTYPE declaration is likewise a container for all other assignments in the DTD and as such should be the first declaration made in any XML document. The basic format for this declaration is

```
<!DOCTYPE document_type_name
[assignments within the DTD]>
```

Because there is usually a large group of declarations, assignments are normally entered on separate lines following the document type declaration. The last entry in the document type declaration is always the closing brackets for the DOCTYPE keyword. Because the data you want to structure deals with purchase orders, you could define the document type as follows:

```
<?XML version="1.0" ?>
<DOCTYPE purchases [
. . .
]>
```

This DTD creates a document type called **purchases**. Within the DTD for the purchases document, you could use any of the remaining assignment types.

```
<?XML version="1.0" ?>
<!DOCTYPE purchases [
<!ELEMENT main (purchase)*>
<!ELEMENT purchase (date,account?,item+)>
<!ELEMENT date {#PCDATA}>
<!ELEMENT account {#PCDATA}>
<!ELEMENT item ((itemno,itemdes,quantity){#PCDATA})*>
<!ELEMENT itemno {#PCDATA}>
<!ELEMENT itemdes {#PCDATA}>
<!ELEMENT quantity {#PCDATA}>
]>
<main>
<purchase>
  <date> 3/15/98 </date>
```

ADDING ELEMENTS TO THE DOCUMENT

Next, you need to define elements for your purchases document. Elements specify the keywords for markup tags that can be used in the body of the document. XML has no predefined element names. To create your own elements you define them using the `ELEMENT` declaration, which consists of an element name followed by a description of the element's contents. If you look at the structure of most purchase orders, you'll find that there are two main types of information: purchase-related information and customer contact information. In XML, you could represent the purchase-related information with a purchase element and the customer contact information with a customer element. Because these elements form the main part of the document, you could define them in the DTD as part of an element called main, such as:

```
<!ELEMENT main (purchase|customer)>
```

Here, the items between parentheses describe the contents of the main element. The pipe symbol ($|$) is an OR statement, meaning the main element would occur with one of the named subelements—either purchase or customer.

XML provides many additional operators to describe how often and in what context elements occur. Figure 2 lists these operators and shows their uses.

Right about now, you are probably wondering what you got yourself into. Not to worry; operators make more sense after



you've used them for a while. Lets start with some fairly basic examples:

```
<!ELEMENT main (purchase|
customer)*>
```

The asterisk indicates that the elements between the parentheses are optional and repeatable.

Within the main element, the purchase and customer elements can occur zero or more times in any order.

<!ELEMENT main (purchase|customer)+>

The plus sign indicates that at least one of the subelements must appear within the main element, and they can be repeated.

```
<!ELEMENT main (customer,purchase)>
```

The comma indicates that the items must appear sequentially, meaning the customer element must precede the purchase element.

Now let's create a purchase element you can use in the DTD. In this example, the comma indicates that the date, account and item elements must appear sequentially within the purchase element:

```
<ELEMENT purchase
(date,account?,item+)>
```

In the body of the document, you could use these elements as follows:

```
<purchase>
  <date></date>
  <account></account>
  <item></item>
</purchase>
```

```
<account> AE4-Robertson </account>
<item>
  <itemno> 8478B </itemno>
  <itemdes> 3 1/2 Floppy Disk </itemdes>
  <quantity> 1000 </quantity>
</item>
<item>
  <itemno> 9375A </itemno>
  <itemdes> 5 1/4 Floppy Disk </itemdes>
  <quantity> 500 </quantity>
</item>
</purchase>
</main>
```

FIGURE 3: A sample XML document with a DTD.

Real Stats. Real Easy.

Visually explore your data to easily see its distribution and focus your analysis like never before.



Create stunning presentations with analytical charts and tables featuring award-winning SPSS pivoting technology.

Go beyond basic business graphs and tables to a unique and in-depth picture of your data that you just can't get in other products.

Manage by fact with SPSS

Competition. Decisions. Deadlines. You're doing more in less time. To manage better, you need reliable information fast.

Today, thousands of people in large and small companies worldwide use statistics to work faster and with more confidence. And as a critical component in management, statistics provide information that goes beyond spreadsheets and simple row-and-column math.

With statistics, you make decisions more easily by uncovering key facts, patterns and trends in your data. Reach your goals with statistics – build models faster; find out how customers really feel about your products; develop customer profiles; uncover differences between groups; segment your market and more.

Dig deeper in your data with Real Stats.

Now you can reveal key facts in data that spreadsheets or databases can't tell you. SPSS enables you to work more effectively with:

- **In-depth statistics.** Go beyond basic counts and percentages to determine variance and distribution in your data. SPSS has the popular statistics people need most, including counts, crosstabs, descriptives, factor analysis, regression and cluster analysis. You can also choose to add more analytical power from a variety of optional modules.
- **Award-winning pivot tables.** With a few mouse clicks, you're interacting with "live," multidimensional reports to gain new levels

of understanding. SPSS pivot tables enable you to swap rows and columns and drill down in data for opportunities hidden in standard paper reports.

- **Dynamic charts.** See the big picture clearly and change it instantly with graphics featuring SPSS' unique pivot table technology. Don't limit yourself to ordinary business graphics – choose from more than 50 analytical charts, you're exploring your data visually and presenting results clearly.

Make your analysis Real Easy.

Don't worry if your statistical skills are rusty – we've packed SPSS with online help. With our Statistics Coach, you are guided to the most appropriate statistic or chart through a series of simple questions. You can get all the help you want, even a Results Coach to help you interpret your results.

Try SPSS and be amazed at how easy it is to get the facts you need.

Easy to learn and use

- Access data easily, even from your corporate database, with our ODBC Wizard
- Prepare data for analysis quickly
- Analyze data thoroughly
- Present results clearly
- Distribute "live" reports electronically

www.spss.com/ads/8.htm
1 (800) 543-5833

SPSS
Real Stats. Real Easy.™
SBAD-0298PCM A5833



ATTRIBUTE TYPES

Attribute type	Category	Description
CDATA	String type	Character data, a string of characters
ENTITY	Tokenized type	The name of an entity
ENTITIES	Tokenized type	One or more entity names
ID	Tokenized type	A valid and unique identifier
IDREF	Tokenized type	A reference to a unique ID
IDREFS	Tokenized type	A list of references to unique IDs
NMTOKEN	Tokenized type	A name token, a string of characters with an implied value
NMTOKENS	Tokenized type	A list of name tokens
NOTATION	Enumerated type	The value must match one of the notation names used in the DTD.
ENUMERATION	Enumerated type	The value must match one of the name tokens in the DTD.

FIGURE 4: When you add an attribute to an element, you need to specify the type.

However, qualifiers have been added to the grammar. The question mark (?) specifies that the account element is optional and should occur once or not at all. The plus sign (+) indicates that the item element is required and must occur at least once. (After all, you wouldn't have a purchase transaction if the customer didn't purchase an item.)

In the examples that follow, we'll focus only on the purchase element. In this way, you'll be able to see a complete example of how all aspects of a key element in a document are created. Because of this, from now on we'll only refer to the purchase element in the DTD. You can, of course, apply similar concepts to flesh out the customer element later.

Although top-level elements, such as a purchase element, are usually containers for other elements, the lowest-level elements in a document will not contain other elements. In this case, you must specify the element's data type. Most basic elements have a declaration stating that they contain parsed character data. In XML, PCDATA is a reserved name that describes basic elements that contain parsed-character or raw data, that is the actual text of the document and can include letters, numbers, punctuation, and special characters. You could define the date, account and item elements as raw data like this:

```
<ELEMENT date (#PCDATA)>
<ELEMENT account (#PCDATA)>
<ELEMENT item (#PCDATA)>
```

The individual items in a purchase transaction probably have additional information associated with them, such as a catalog number, a description of the item and the number of items purchased. You can track this information within the item element. These elements could be named itemno, itemdes, and quantity respectively. Although most purchase transactions will contain actual purchases, a customer may be altering or canceling a pre-

vious order. In this case, you may need to place a note describing the action in the item field. Thus you need to define the item element so that it can contain subelements or actual data, such as:

```
<ELEMENT item
((itemno,itemdes,quantity)|#PCDATA)>
```

This element can contain three sequential subelements, or it can contain raw data. If the item element has subelements, the markup would look like this:

```
<item>
  <itemno></itemno>
  <itemdes></itemdes>
  <quantity></quantity>
</item>
```

Otherwise, the item element would contain raw data, such as:

```
<item> Correction to purchase.
Purchase canceled. </item>
```

Once you've made assignments within the DTD and have broken the elements down to the lowest level, you can use the DTD in a document as shown in Figure 3. The document begins with a processing instruction, which is followed by the DTD. The DTD specifies the elements for the document as well as how often and in what context the elements occur. The body of the document follows the DTD and contains a sample purchase transaction.

Although the example lays out the structure of the data, formatting the data is up to the application interpreting the data. Using the extensions of the XML processor to search and read the document, the application can move through each level of information in the data structure and format the elements accordingly. For example, the application may

display each element in a purchase transaction as an editable field on the user's screen, allowing the viewer to edit the transaction and reinsert it into the company database.

ADDING ATTRIBUTES TO ELEMENTS

After you define elements for the document, you may want to provide additional information about those elements to the XML processor. You can do this with attributes. You define a list of attributes for an element with the ATTLIST assignment. Because a document's elements are completely configurable, you are free to create attributes as necessary.

Although most HTML attributes are used to format data, most XML attributes are used to provide additional information regarding the structure of the data. The application reading the document could use the attributes to set certain flags, such as whether an order has been processed. The application could in turn use this flag to determine if data can be edited.

Unfortunately, while the concept of attributes is fairly straightforward, attribute definitions are somewhat cryptic. The basic format of an ATTLIST assignment is

```
<ATTLIST element_describing name type
default_usage>
```

What this means is that when you create attributes, you must first specify the element the attributes relate to, then you must give each attribute a name, a type and default usage. Attribute names are for the most part arbitrary and you can assign any name you desire. On the other hand, attribute types and defaults may cause you to lose some sleep.

Figure 4 summarizes the available attribute types. As you see, they fall into three categories: string types, tokenized types and enumerated types.

You can also specify the default usage of an attribute. For string and tokenized attributes, the default usage can be set with these keywords:

#IMPLIED: A value is optional for this attribute. The processor should notify the system when no value is set, but the document can still be considered valid.

#FIXED: The value is fixed and cannot be changed. The document is not valid if the attribute is used with a value different from the default.

#REQUIRED: A value is mandatory for this attribute. If no value is set, the document is not valid.

For enumerated types, the default value for the attribute must follow the permissible values.

Putting all this together is easier than it may seem. Let's start by creating attributes for our purchase element:

```
<!ELEMENT purchase
(date,account?,item+)>
<!ATTLIST purchase
  id      ID      #REQUIRED
  clerk   CDATA   #IMPLIED
  complete CDATA   #FIXED "yes"
  type    (walkin|web|phone|mail)
  "walkin">
```

You could use these attributes in a document as shown in Figure 5. Here, the "id" attribute is defined as an ID attribute type and could be used to track a unique identifier for each purchase order. Because the id attribute is required, it must be present in a purchase element. If it is not, the document is considered invalid. (Remember, a valid document is one that conforms to its DTD.)

The next attribute is called "clerk." It contains character data and is optional. Because no specific values have been set for clerk, any value is considered valid. This allows you to assign a clerk's name to the purchase order without having to define a list of all the clerks in the company.

The third attribute for the purchase element is called "complete," and it could be used to determine if an order has been entered or is pending. The attribute contains character data and has a fixed value. If the attribute is used with a value other than the specified value "yes," the document is considered invalid. Rather than displaying the invalid document, the application processing the document could mark the transaction as incomplete and inform the reader that the

current transaction is pending.

The final attribute for the purchase element is an enumerated type. The attribute has four name tokens that define the valid values for the attribute. From these tokens, you can determine that purchase transactions are defined as walk-in orders, Web-related orders, phone orders or mail orders. The default value for the attribute is "walkin." Thus if no value is specified, the purchase transaction is assumed to be a walk-in order.

COMPLETING THE DTD

After defining the necessary elements and their attributes, the DTD for the purchases document type is almost finished. Before you call it a day, you may want to add some additional information to the document, such as your company name or copyright information. Although you could insert this information directly into the document, XML does provide a mechanism that makes it easier to maintain documents over time. This mechanism is called an *entity*.

In its basic form, an entity is a component that can be substituted into a document based on a declaration. The component can be a text string or any type of file. Because entities allow text and files to be substituted into a document, they can be used to replace values when a document is displayed.

Unlike HTML, XML allows you to define your own entities. Let's say your company name is CPC Enterprises Ltd., and you want to add this information to all your purchase orders. To do this, you could define an entity called `CompanyName` that would insert the company name into the document. You follow the entity name with the replacement

text between quotation marks, such as:

```
<ENTITY CompanyName "CPC Enterprises
Ltd.">
```

Now you can use the entity in a document by adding the prefix `&` and the suffix `;` to the entity name, such as `&CompanyName;`. When the XML processor encounters the `CompanyName` entity, the processor replaces the entity with its value. One reason to use entities is that it makes documents easier to maintain. For example, if the company name changes to "CPC Worldwide LLC," you only need to make that change in one place. You change the entity entry in the DTD and the document will be displayed with the correct company name.

Entities can also be used to insert symbols into a document. For example, you could use an entity to insert a copyright symbol into your purchase order documents.

Keep in mind though that by default, XML processors don't parse the replacement text. This means that entities defined within an entity would not be inserted correctly. You can, however, tell the processor to parse the contents of the replacement text. You do this by inserting the `%` character before the entity assignment. For example, if you wanted an entity to display a copyright symbol embedded in the copyright information, you would need to tell the processor to parse the entity, like so:

```
<ENTITY % Copyright "&#xA9; 1998 CPC
Enterprises Ltd.">
```

Here, this statement must be parsed to replace the entity `©` with its value. The

```
<?XML version="1.0" ?>
<!DOCTYPE purchases [
<!ELEMENT main (purchase)*>
<!ELEMENT purchase (date,account?,item+)>
<!ELEMENT date (#PCDATA)>
<!ELEMENT account (#PCDATA)>
<!ELEMENT item ((itemno,itemdes,quantity)|#PCDATA)*>
<!ELEMENT itemno (#PCDATA)>
<!ELEMENT itemdes (#PCDATA)>
<!ELEMENT quantity (#PCDATA)>
<!--ATTLIST purchase
  id      ID      #REQUIRED
  clerk   CDATA   #IMPLIED
  complete CDATA   #FIXED "yes"
  type    (walkin|web|phone|mail) "walkin"-->
]>
<main>
```

```
<purchase id="E-208765" clerk="Smith" type="phone"
complete="yes">
  <date> 3/15/98 </date>
  <account> AE4-Robertson </account>
  <item>
    <itemno> 84788 </itemno>
    <itemdes> 3 1/2 Floppy Disk </itemdes>
    <quantity> 1000 </quantity>
  </item>
  <item>
    <itemno> 9375A </itemno>
    <itemdes> 5 1/4 Floppy Disk </itemdes>
    <quantity> 500 </quantity>
  </item>
</purchase>
</main>
```

FIGURE 5: This shows several attributes added to the purchase element.



FRESH CLIENTS DON'T ARRIVE DAILY.

When you land the big ones, don't let 'em go. Get to know more about them than just their names and addresses. Make sure your entire company knows, too. If you treat them well, they'll be back for more.

Sound easy? It can be if you use Maximizer.® Our complete customer and contact management software gives you the tools to know your customers. And keep track of all the details on their businesses. It's intuitive and easy to use, too.

Need to communicate by mail, fax, phone or e-mail? No problem. Maximizer even keeps track of the correspondence. When they call back, you and your team will have the information at your fingertips. Your customers will be impressed.

You can also grow your business by analyzing your customers' profiles. Then connect to our online database of over 100 million consumer and business listings. You can search and download qualified prospects based on criteria you select. But only with Maximizer as your partner.

Order your Maximizer for only **\$149**, with a one-year money-back guarantee.
One taste, and you'll be hooked. Call **1-888-535-4015** today.

Maximizer.

Manage Customers. Maximize Growth.
www.maximizer.com/pcmag

Available at: CompUSA, Computer City, Best Buy, Fry's, Future Shop, London Drugs, Business Depot, Micro Center, Elec-Tek, Micro Warehouse.

©1998 Maximizer Technologies, Inc., 1090 West Pender Street, 9th floor, Vancouver, BC, Canada V6E 2N7, tel 604 601-8000, fax 604 601-8001. All trademarks mentioned herein are the property of their respective owners. This offer is subject to change and is not valid with other offers. Price is in U.S. dollars. Shipping and handling charge is extra and is non-refundable.

Choose 201 at www.pcmag.com/infolink




```
<?XML version="1.0" ?>
<!DOCTYPE purchases [
<ELEMENT main (#PCDATA|purchase)*>
<ELEMENT purchase (#PCDATA|(date,account?,item+))*>
<ELEMENT date (#PCDATA)>
<ELEMENT account (#PCDATA)>
<ELEMENT item (#PCDATA|(itemno,itemdes,quantity))*>
<ELEMENT itemno (#PCDATA)>
<ELEMENT itemdes (#PCDATA)>
<ELEMENT quantity (#PCDATA)>
<!ATTLIST purchase
  id ID #REQUIRED
  clerk CDATA #IMPLIED
  complete CDATA #FIXED "yes"
  type (walkin|web|phone|mail) "walkin">
<INOTATION gif SYSTEM
"http://www.yoyo.com/apps/iviewer.exe">
<ENTITY corplogo SYSTEM "../images/logo.gif" NDATA gif >
<ENTITY pimage SYSTEM "../images/prod.gif" NDATA gif >
<ENTITY igif SYSTEM "../images/ibullet.gif" NDATA gif >
]>
```

```
<main>
&corplogo;
<purchase id="E-208765" clerk="Smith" type="phone"
complete="yes">
  &pimage;
  <date> 3/15/98 </date>
  <account> AE4-Robertson </account>
  <item>
    &igif;
    <itemno> 8478B </itemno>
    <itemdes> 3 1/2 Floppy Disk </itemdes>
    <quantity> 1000 </quantity>
  </item>
  <item>
    &igif;
    <itemno> 9375A </itemno>
    <itemdes> 5 1/4 Floppy Disk </itemdes>
    <quantity> 500 </quantity>
  </item>
</purchase>
</main>
```



FIGURE 6: Using Entities and Notations in an XML Document.

entity © corresponds to the copyright symbol and is specified with the ASCII value of the symbol expressed in hexadecimal notation. In your XML document, you add the prefix % and the suffix ; to the parameter entity name, such as %Copyright;. The entity is parsed and replaced with © 1998 CPC Enterprises Ltd.

Before you complete the DTD, you may want to define a logo or banner to display in each purchase order document. Fortunately, entities can also be used to reference a file to be inserted into the document. Here, you use the SYSTEM keyword to identify the URL of the file. SYSTEM is a reserved keyword that tells the XML processor the referenced external entity is in a file. You could use the SYSTEM keyword to insert a file into an XML document as follows:

```
<ENTITY AddData SYSTEM
"http://www.yoyo.com/data/dd.xml">
```

When the XML processor encounters the AddData entity, it processes the file and then replaces the entity with the processed contents of the file. Although you usually want the processor to parse XML documents, you probably don't want the processor to parse other types of files, such as the image file for the corporate logo. To specify that a different application or processor should handle the file, you use the keyword NDATA, which is a pointer to a previously declared notation (see discussion of notation below) and can be used as follows:

```
<ENTITY corplogo SYSTEM
"../images/logo.gif" NDATA gif >
```

Now when you use the corplogo entity in a document, the processor uses the GIF notation to determine how to handle the entity. You declare the GIF notation using the NOTATION assignment. This assignment is used to specify a helper application that can process a particular type of data, for example, an image viewer to display the corporate logo. (Note that while the notation assignment is certainly useful, the XML processor must be designed to work with helper applications. If it is not, you're better off using the features of the application's programming language to display alternate types of data, such as images. For example, in a Java application, you'd use Java's built-in image-handling facilities to display an image with the document text.)

When you create a notation, you identify the URL location of the helper application using the SYSTEM keyword. Here, the GIF notation uses a helper application located at <http://www.yoyo.com/apps/iviewer.exe>:

```
<INOTATION gif SYSTEM "http://www
.yoyo.com/apps/iviewer.exe">
```

You must define the viewer for the corporate logo using the NOTATION assignment before you refer to it with the NDATA keyword, like this:

```
<INOTATION gif SYSTEM "http://www.yoyo
.com/apps/iviewer.exe">
```

```
<ENTITY corplogo SYSTEM "../images/
logo.gif" NDATA gif >
```

And that's it! You've completed the DTD for your purchase order documents. Now you can use the DTD as shown in Figure 6. As you study the example, note that some of the elements have been modified to allow them to contain raw data. This change is necessary to ensure that the document is still considered valid when actual data entries and entities are used with the main, purchase and item elements. XML processors consider the data entries and entities within an element to be raw data.

SUMMING IT ALL UP

XML is as versatile as it is useful. You can use the language to specify complex data structures in terms of simple markup and then easily transmit the data across a network. As the technology matures, you will also be able to include links and formatting within a document. Until that day however, don't forget that XML is used to specify the structure of data, not its format. To format the data, you will need to rely on your XML-compliant application. **PC**

William Stanek is the author of several books including Learn the Internet In A Weekend and Increase Your Web Traffic In A Weekend, published by Prima Publishing. His latest book, Server-Side JavaScript: The Definitive Guide, will be published by O'Reilly & Associates in June. He can be contacted at techwriting@tvpress.com.

E-Mail for People on the Go

IMAP can make your e-mail account more accessible and more private.

By Neil Randall

An e-mail protocol is a set of commands and responses exchanged between a mail client and a mail server. The mail client is the program used to compose, send, and receive e-mail. Mail clients include Calypso, E-Mail Connection, Eudora, Lotus Notes, Microsoft Outlook and Outlook Express, Netscape Mail, and the Unix staples elm and pine. Most users know their mail clients as well as or better than they know any other software. But few know about the "other side" of e-mail, the server, which receives messages from the network and stores them in the recipient's account, waiting to communicate with a client program. What goes on during that communication depends on the chosen protocol.

For the past few years, the most popular e-mail protocol for Windows and Macintosh users has been the Post Office Protocol, now in Version 3 (POP3). POP has become one of the Internet's more successful acronyms, with users and administrators referring to POP accounts, POP servers, and POP support. But POP's dominance for GUI operating systems is in danger of being overtaken by a relatively new kid on the block, IMAP, now in Version 4, Revision 1. Short for Internet Message Access Protocol (originally Interactive Mail Access Protocol), IMAP is being built into all significant e-mail clients on the Windows platform. Calypso 2.0, Eudora 4.0, Netscape Mail for Communicator 4.0, and Outlook Express for Internet Explorer 4.0 all have IMAP4 capabilities, as does Outlook 98 (in beta as of this writing; see Figure 1). At present, not all servers can handle the IMAP4rev1 proposal.

IMAP4's power lies in three main areas:

- IMAP is bandwidth-friendly, offering efficient use of connect time. An IMAP client has a choice of downloading only message headers, message headers and bodies but not attachments, or all message components. The client connects to the server, gets the amount of information you specify, and disconnects. POP3 allows you to direct the server to download only messages below a specified size limit but is much less efficient in this regard than IMAP.

- IMAP allows for the creation of hierarchical folders on the remote server, where POP3 creates local folders. Messages can be stored, sorted, filtered, and managed on the server, making it possible for users to maintain a system of folders that they can access from multiple computers. Client programs can resynchronize mailboxes with the server, so that messages transferred to folders or deleted will appear in (or disappear from) each client's view. All clients display the same messages.

- IMAP contains built-in database capabilities that allow users to define rules for managing mail. The rules are configured according to values appearing in the message headers or in the message bodies and can be as specific as deleting messages from certain users when those messages are older than a specified

server to a local hard disk, and the client acts on the messages locally. The disconnected model keeps messages on the server. Clients can act on them remotely or download them to a local drive, and multiple clients for the same account (on different machines, for example) see precisely the same thing.

Of these, online was the earliest form of e-mail and is the model you still use if you read your mail by telnetting into your account and using elm, pine, or good old Unix mail. The principle is that the mail client connects to the server and maintains the connection throughout the session. The function of the client is to let you work with mailbox data, which is stored on the server. You can read, send, delete, forward, and reply to messages, and you can create mailboxes or folders to organize them. But you can't actually download mail to your hard disk. The model is therefore friendly to the local machine but places an obvious burden on the server. Server disk space and availability are constant issues.

Much more familiar to Windows users is the off-line model, on which POP3 is based. As

RFC 1225 describes, an off-line mail client connects to the server, as requested by the user, and then downloads all the mailbox data to the client's computer. By default, once the download is successful, the client deletes the data from the server, which in this model is known as a *maildrop*. POP3 has been the dominant protocol precisely because it localizes all mail procedures. You create folders in your e-mail program in which you store individual messages, you add signatures at the time of composing without the need to store a separate signature file on your server, and most important, you can compose and read messages off-line with a familiar interface. File attachments are much simpler than

with the online model, because attachments are on a local disk (or a local network drive), which is accessible by the client. Attaching files with the online model usually involves uploading the file to your account on the server (usually through FTP) and then attaching it from there.

The initial concept behind POP3 was that each user would access e-mail from only one machine, downloading all data from the maildrop. Obviously, such a system is useful only if a user works exclusively from a single computer, and with the explosion of e-mail, the concept quickly became obsolete. POP3 technology developed further, allowing clients greater control over the mailbox data on the

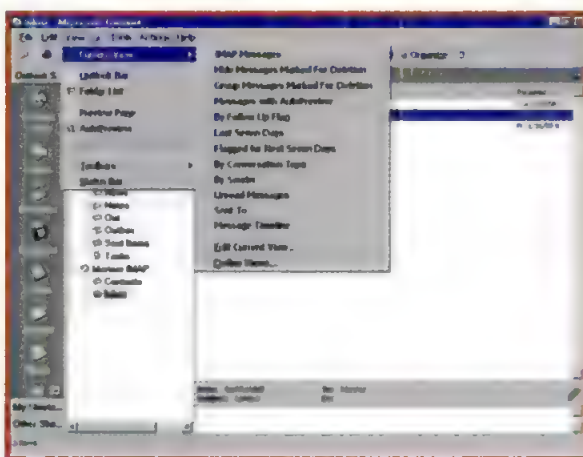


FIGURE 1: These are the choices in Outlook 98 (beta 2) for viewing messages in an IMAP folder.

number of days. Rules can also state that only certain messages will appear in the client. Building the rules into the server, as opposed to the client (as POP3 filters do), makes the process faster and more configurable.

THE THREE E-MAIL MODELS

IMAP4 actually dates from December 1994, when it appeared in RFC 1730. In the same month, RFC 1733 outlined three "distributed electronic mail models": online, off-line, and disconnected. In the online model, all mail messages reside on the server, with the client providing a window for reading and manipulating messages. In the off-line model, the client downloads the mail messages from the

Introducing PANTONE OfficeColor Assistant™

NOW MATCH CORPORATE COLORS IN MICROSOFT® WORD, EXCEL AND POWERPOINT.



Finally, professional color for Microsoft Office users. Until now, matching corporate colors in PowerPoint or other Office applications was literally trial and error. At last, PANTONE OfficeColor Assistant delivers what you need. Professional full-color bandwidth: more than 1,000 precision PANTONE Colors you can select by number*, right from within your applications. Never again settle for a color that's almost right; get it perfect. Get PANTONE OfficeColor Assistant and color coordinate your office today.



*The PANTONE MATCHING SYSTEM® is the recognized international standard for color matching.

PANTONE OfficeColor Assistant
PANTONE Colors for
Microsoft Office 97/98 **\$29.95**

Free trial download:
www.pantone.com/officecolor/

To order:
call **888-PANTONE**
or visit www.pantone.com

PANTONE®

HOW THE WORLD AGREES ON WHAT IT SEES™

server. Today's POP3 clients, for example, let you leave all your messages on the server, so that they can be accessed from any machine; several clients go a step further, keeping messages on the server for specific time periods or deleting them from the server when a user deletes them from the local Trash folder.

Such features have been welcome, but they have caused two additional problems. First, users who want access to their mail on more than one machine frequently set the clients on each computer to leave the mailbox data on the server and then never delete any of it, depleting user disk space and inevitably losing the ability to access the account at all. (This usually happens deep into the weekend, for maximum inconvenience to both user and technical staff.) Second, there is no way to synchronize mail messages and folders across a user's various client machines, except through the manual process of erasing and storing.

IMAP4 is a protocol in the disconnected e-mail mode, which attempts to solve problems of multiple client machines and mailbox synchronization. In this model, the server acts as the main storage area for mailbox data, with the clients downloading only the messages a user specifies. Furthermore, you can manage your messages directly on the server, adding folders for storage and deleting messages you don't need. Messages and folders stay on the server, however, so when you log into the IMAP server from a different machine (or a different IMAP-enabled mail client on your machine), the mail client has access to precisely the same messages and folders as your regular client.

In other words, IMAP lets you see and work with messages as if they've been downloaded to your local machine, with such elements as folders, multiple signatures, and client software made for your particular operating system, but the mailbox data isn't local at all. It's stored on a remote server and is accessible and flexible to the degree that all your mail clients share the same mail data in the same way.

IMAP4rev1 is outlined in RFC 2060. A proposed revision can be found at ds.internic.net/internet-drafts/draft-crispin-imapv-04.txt.

HOW IMAP WORKS

IMAP is a full client/server protocol. Mail data stays on the server and is accessible and manageable by any number of client programs. So far, the protocol requires that only one server manage mail data. RFC 2193, "IMAP4 Mailbox Referrals," offers a means for IMAP clients to receive mail data from multiple servers. Like server clustering in operating

systems, the proposed approach allows servers to be set up so that the failure of one server does not knock out the entire system. With POP3 or earlier online models, if the server isn't working, you can't get your mail.

IMAP begins with a client establishing a connection with a server. The server acknowledges the request, and the two interact to carry out a user's requests. Every *client command* is given an alphanumeric tag (an individual identifier), and the server responds by referring to the tag. When it receives more than one command simultaneously, the server responds to them according to which can be dispensed with first.

To end a transaction, the server sends the client a *server completion response*. This response is given the same tag as the initial client command. If the server requires additional information, such as a password, it issues a command-continuation request re-

IMAP4 is a protocol in the disconnected e-mail mode, which attempts to solve problems of multiple client machines and mailbox synchronization.

sponse in place of the completion response, holding the connection open until it receives the necessary data from the client. Instead of a tag identifier, command-continuation requests are given the token +.

One other token is possible besides +. Untagged responses are given the token *, which indicates a server-initiated data exchange. This token is used for information such as the server's acknowledgment of the client and for automatic server activities such as unrequested reporting of new messages or other changes to the folders. For example, if two clients are simultaneously accessing the same mail account (it could happen in the case of a generic account, such as info@domainname.com) and one user issues commands to move or delete messages, the server will report the changes as a tagged response to the client that issued the commands, and as an untagged response (with the token *) to the client that did not.

The central element of the IMAP connection is the *state* of the server. The server can be in one of four states: *not authenticated*, *authenticated*, *selected*, or *logout*. For the most

part, client commands work only when the server is in a corresponding state. The first, not authenticated, exists when a client establishes a connection; the server looks for proof that the client can access the account (user ID and password). Once validation is given, the server enters the authenticated state, and only at that point are the folders accessible. This system provides a simple but highly useful means of keeping prying eyes out of your mail folders, a feature that POP3 clients such as Eudora, Netscape Mail, and Outlook Express lack. In those mailers, you might well need a password to retrieve new mail, but mail already downloaded is available to anyone who chooses to launch the program. IMAP's authentication offers a welcome "for your eyes only" system.

The server enters the *selected* state when a user selects a mail account. An in-box folder is created by default on the server, but users can add as many as they wish. The server can enter the selected state only if it has reached the authenticated state. Otherwise, the folders are inaccessible. The logout state, as the name suggests, is the state of closing the connection. The selected state can be initiated only by the client, but the logout state can be entered as the result of a client command or server decision.

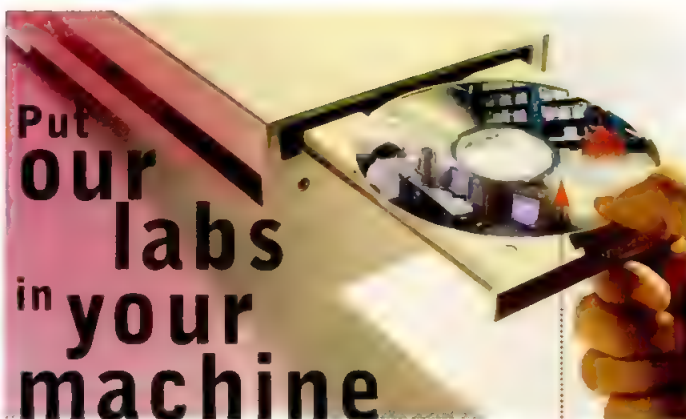
Client commands usually depend on the server's state. Some, however, are valid no matter what state the server is in. *CAPABILITY*, for example, is a client request to determine which IMAP features the server supports. IMAP is updated continually, as are its clients and servers, so older servers might not support the same features as newer clients. For example, the IMAP extension *Quota*, with which the server sets limits for data storage, is not yet supported by any of the popular clients. Other state-independent client commands are *NOOP* (polling the server for new messages or message actions) and *LOGOUT*.

Only two commands are possible with the server in the nonauthenticated state: *AUTHENTICATE* and *LOGIN*. One interesting feature of *AUTHENTICATE* is the possibility of anonymous log-on access to specific folders, which may be desirable with shared accounts.

With the server in the authenticated state, the real action happens. First up is the *SELECT* command, with which the user chooses a mailbox. With clients such as Communicator, Outlook Express, or Outlook 98, this is simply a matter of clicking on a folder. After this, you're in selected state. The server will respond with a range of untagged information, most significantly *EXISTS*, which tells the user the number of messages in the mailbox, and *RECENT*, the number of messages that have

PC
MAGAZINE
PCWEEK
Windows
PCComputing
COMPUTER
SHOPPER
MacUser
MacWEEK

Put
our
labs
in
your
machine



"Thanks for the service you provide in giving us a set of benchmarks that are professional, realistic, and available. This puts more objective science into our industry and prevents a lot of hype."

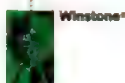
**Professor Richard G. Helps
Dept. of Manufacturing
Engineering & Technology
Brigham Young University
Provo, Utah**

**ZD Ziff-Davis Benchmarks:
The Whole World Watches**

Ziff-Davis Benchmark Operation, 1001 Aviation Parkway, Suite 400, Morrisville, NC 27560

FREE!

Download our benchmarks from ZD Net/CompuServe (GO ZDBOP) or from our home page at <http://www.zdnet.com/zdbop>. Or, for a CD-ROM (\$5 each for shipping and handling) fax your credit card information to 919-380-2879 or send a check to ZDBOP. Allow 4 to 6 weeks for regular delivery or enclose your FedEx number.



WinStone*



WinBench*



NetBench*



ServerBench*



MacBench*



PCTech

been added to the mailbox recently—that is, within a duration specified by the server.

Many other client commands are available. CREATE, for example, establishes a new mailbox. The server refuses CREATE commands with a mailbox name that already exists. Child mailboxes can be created under parent mailboxes. DELETE and RENAME also pertain to mailboxes. STATUS returns information about a selected mailbox, including the number of messages, without changing details, such as which messages are recent.

All messages can be given one or more flags, which are dependent on the server's capabilities. The /Recent flag, for example, reports to the client that a message is new (within specific time limits), while the /Deleted flag marks a message for deletion. In the IMAP client, the user can set the /Deleted flag by selecting the Delete command from the appropriate menu (or, typically, by pressing the Del key). But the message is not deleted from the server until the server is in the authenticated state and the user sends the EXPUNGE command.

Of particular interest are the SEARCH and FETCH commands. Search keys let users specify quite precisely what they want to find; they include the possibility of searching all messages that have been replied to (these bear the /Answered flag), messages with particular FROM, CC, or BCC fields, messages larger than a specific size, new messages only, those that have been sent since a specific date, and so on. The FETCH command retrieves message data. Users can specify that they want to retrieve specific sections of the message's body structure, such as the body text, the various headers, or the MIME attachments. To show the potential sophistication of this command, it's even possible to retrieve a message through a data item called BODY.PEEK, which lets you read a message without setting the /Seen flag, which would indicate that you have in fact read it.

So far, clients take much less advantage of IMAP than they could. But as the protocol comes into greater use, clients will offer a full feature set. What remains to be seen is whether IMAP will become predominant in noncorporate settings. Storing mail data on a server offers huge advantages for users, but it also takes up more server resources than ISPs might be willing to provide. IMAP seems destined primarily to be an organizational mail protocol—just as it's intended to be. **PC**

Neil Randall, a frequent contributor to PC Magazine, is the author of The Soul of the Internet (ITCP) and Special Edition Using Microsoft FrontPage 98 (Que).

Philips Monitors: Helping you see your vision



Everyone has a vision. And these days, more often than not, the ubiquitous PC plays a pivotal role in turning that vision into reality.

But people – not machines – transform raw data into tangible commercial concepts. Leap the bound between a great idea and marketable product. Bits, bytes, RAM, speedy chips and advanced software can't create schematics, schedule production, analyze data, craft stunning brochures to spur sales or design eye-catching home pages. Only people can.

Helping you see your vision

That's where we come in. A monitor is the interface that melds the power of a personal computer with the irreplaceable spark that only people can contribute to creative process.

Philips Monitors are your window to the world of computing. Easels on which your vision is born and blossoms.

Your vision deserves nothing less!

Based on a bright idea

Nearly a century ago, the Philips Group was founded on a bright idea: Making better filaments for electric lights. Today, a truly global company, Philips makes life better with a stunning array of products. But for all its diversity, that product line is linked by unchanging concepts: quality, innovation and reliability.

Just as Philips original products helped light up the world, Philips monitors bring brightness to the world of computing.

Quality, innovation and reliability made us one of the world's Top Two monitor manufacturers. And quality, innovation and reliability help you see your vision better.

Tailor-making things better

One size does not fit all! Not in today's specialized world of business and home computing.

Varied applications demand monitors where features follow function. And tight budgets require the thoughtful marriage of capability and cost.

Philips Standard series delivers quality, reliability and the power to get the job done - without costly 'bells and whistles' that customers don't need and can't afford.

For more demanding applications, the Business line of monitors adds just the right features for more complex missions -- while retaining a highly favorable cost-benefit ratio.

And when only the best will do, Philips award-winning Professional line delivers unique state-of-the-art engineering and unprecedented performance that meet - and exceed - customer requirements for quality, innovation and reliability.

Continued ...

Let's make things better



PHILIPS



Brilliance 4500AX



Brilliance 201P



Brilliance 109

It's all about vision.

Philips Innovation

Everyone has a vision. Ours is to help you see your visions better - more clearly, more accurately and more affordably.

Here are some of the products and technologies that illustrate our vision - and show off yours.

Making monitors CrystalClear



Philips asked customers what they wanted from a monitor. Overwhelmingly, folks who spend their working days behind a PC replied

- Sharp and comfortable picture
- Bright and natural color
- Distortion-free images

Our answer? Philips CrystalClear technology that delivers breakthrough benefits that users demand.

USB Bay- Universal Serial Bus Freedom of Choice



New technologies provide a unique challenge to hardware purchasers.

Universal Serial Bus technology offers the promise of true plug and play. But months may pass before operating systems and peripherals are fully ready to put USB to work for end users.

Pay today for a capability you can't use until tomorrow? Or risk missing the boat when USB is ready? Philips Monitors diffuses the dilemma with USB Bay, a physical slot at the rear of selected monitors that accommodates an optional Philips USB module. Result: Easily and economical upgrades when - and if - you're ready to migrate to USB.



Liquid Assets

Will 1998 be the year of the LCD monitor?

Four factors converge to support forecasts for a surge in demand for liquid crystal display -- flat panel monitors like Philips Brilliance 151AX, 15-inch LCD monitor.

Moving toward picture perfection. New TFT technology makes LCD monitor display a "feast for the eyes."

Moving up front. Brokers, banks, travel agents and retailers are increasingly using LCD monitors to convey information - plus a high-tech, high prestige corporate image - to their customers.

Making room. In many parts of the world, office space is at a premium. Flat panel monitors are space-savers.

Making no waves. Research labs and health care facilities require emission-free monitors that can co-exist with delicate instruments.

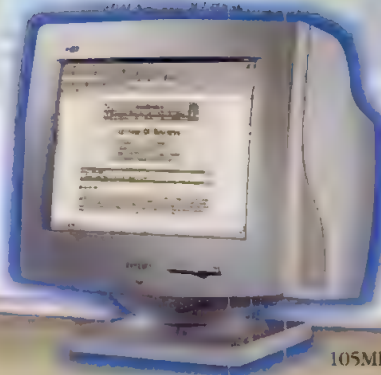
Philips Brilliance 151AX delivers significant people-friendly, ergonomic features:

- **NO EYE STRAIN:** The top-of-the-line TFT LCD screen is completely flicker-free at any video resolution or refresh rate. The monitor is also radiation-free, noiseless, lightweight, low in energy consumption and emits negligible heat.
- **CONNECTIVITY:** Brilliance 151AX's analog interface with very wide preset frequency range and 75 Hz compatibility (the typical Windows default) mean that no user set-up is necessary under normal operating conditions. The Brilliance 151AX uses

Let's make things better



107MB



105MB



109S

Yours and Ours

leading edge electronics to assure an optimal, full screen picture at all preset video modes and resolutions.

- **OPTIMAL POSITION ADJUSTMENT:** A special hinge integrated in the monitor cabinet insures easy tilt and rotation adjustment for optimum viewing, even on wall or arm mounts.
- **PROTECTIVE COVER:** On a normal LCD monitor, the display surface is extremely sensitive to water from cleaning or coffee spills, scratches from cleaning or poking with a pen, fingerprints, etc. The optional protective cover eliminates all these problems with a distinctive and aesthetically pleasing design.

Bigger is better

"Make a better - and more affordable -- big screen monitor and the world will beat a path to your door."

That's what customers told Philips Monitors. And that's what Philips R&D created with the Brilliance 109.

Brilliance 109 showcases Philips new CrystalClear technology and delivers upgrade-ability with USB Bay.

Whether you're crunching numbers on mega-spreadsheets, working with graphics-intense applications, designing skyscrapers or Web sites, Brilliance 109 combines an unprecedented package of big screen prestige, tomorrow's technology and an unbelievable cost-benefit ratio. Truly a monitor for all seasons.

When only the best will do

Document Image Processing. Cartography. Visual simulation, data visualization, and solid modeling. DTP. Computer Aided Engineering (CAE), CAD/CAM, Architecture design and construction. Computer graphics, 3D rendering, animation, and virtual reality.

With many professional applications, large screen size, ultra-high resolution, superb performance and flicker-free display aren't perks or luxuries; they're absolute necessities for accomplishing the mission.

When only the best will do, but an outstanding cost-benefit ratio remains a must, Brilliance 201P and Brilliance 201B make a unique statement about quality, reliability and economy.

Both feature CrystalClear technology for superb performance and USB Bay for upgradability.

Basic, bigger and better

With its excellent cost to performance ratio, Philips 107MB is the definitive, general use office monitor, designed to satisfy users' demands, without the unneeded cost of advanced features.

Intensive business users require and deserve higher resolution, faster refresh rates for flicker-free performance and multimedia capabilities. With 1280 x 1024 resolution at 75HZ and multimedia-ready capacity, Philips' 107MB monitor is the best choice for today's rapidly changing office environment.

Philips Monitors -

Everyone has a vision. Helping you see your vision better is ours!

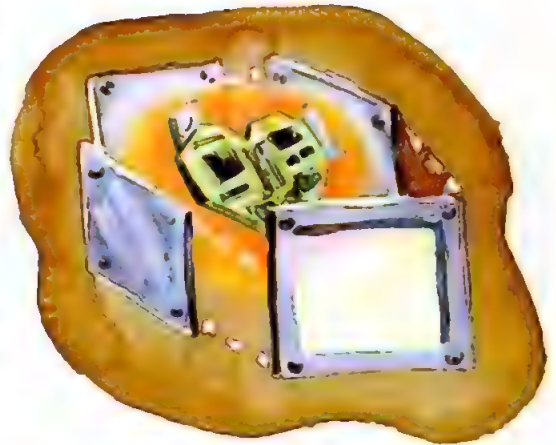
www.monitors.be.philips.com

MOTHERBOARDS:

THE HEART OF YOUR PC

Every PC has one, yet most people don't think much about it. Your PC's motherboard is essential to the computer's operation and ties all of the discrete components together. If you think of a CPU as the computer's brain, then the motherboard is its heart.

Without it data would not move from one place to another, you wouldn't be able to access that data and it would be nearly impossible to use a keyboard and monitor. In each of these examples, you are accessing two or more PC components that don't interact without some connecting electronics: **THE MOTHERBOARD.**



Situated at the bottom of a desktop PC case or the side of tower unit, the motherboard looks like an expansion board, only larger. It is virtually covered with chips and sockets, and houses the CPU, memory, expansion slots and associated electronic parts. Every component on your PC connects to the motherboard, creating a communications web among all of these pieces — effectively allowing each part to communicate with each other part. That's a nifty and essential trick, and without it, PCs would be very difficult to use.

As ubiquitous as motherboards are, they are still highly specialized electronic devices, designed with a very specific set of functions in mind. Each processor family employs its own feature set requiring an optimized motherboard design that can properly route the signals to the appropriate components. This basically means that you must match your motherboard to your processor family, and vice versa.

Signals In, Data Out

For all electronic components, clock frequency — system clock — is critical, and for motherboards the clock frequency is governed by the CPU. Your motherboard must support the clock frequency that your processor requires, so in addition to the socket or chip type, your system clock must match the processor.

Nevertheless, we all equate system performance with clock speed and typically desire faster (read higher frequency) processors and motherboards. To reach these higher speeds, processor manufacturers employ a technique known as clock

multipliers that raise the clock frequency of the CPU chip without affecting the speed of the system bus. From this we obtain a processor's 'internal' and 'external' speeds: the speed of operations within the processor and the speed of operations across the bus. With a standard clock speed of 66MHz, the motherboard halves this frequency to 33MHz to talk to the PCI bus while the clock multiplier will triple it to address a 200MHz Pentium.

Memory types, too, are determined by both bus and processor speed. Though fast page mode (FPM) and extended data out (EDO) memory operate at the same system bus speeds, EDO memory is capable of running even faster. EDO memory is also designed to work more readily with higher speed processors. Pentium motherboards support both FPM and EDO SIMM memory modules. Most of the new higher speed Pentium processors — like the 233MHz and Pentium II chips — use SDRAM modules. These higher speed modules, known as DIMMs, use a completely different motherboard socket, so you must be careful to select the correct memory module when upgrading.

BIOS, the basic input/output system, is the interface between the motherboard and the operating system. It also controls the lowest level of your computer's operation such as serial and parallel ports, disk drive interfaces and power conservation. Most PC motherboards use EPROMs (Erasable read-only memory) or more recently, Flash memory, to store the BIOS information. Fortunately, both EPROMs and Flash memory let you upgrade or change the BIOS as necessary.



A SIGN FROM THE WISDOM

ABIT INTELLECTA 300 PC BRING YOU INTO A NEW ERA



ABIT
Your Reliable Partner



ICOMP® Index 2.0

ICOMP® Index 2.0 compares the relative performance of different Intel microprocessors

PROCESSORS	SPEED RATING
Pentium® II 300 MHz	332
Pentium® II 266 MHz	303
Pentium® II 233 MHz	267
Pentium® with MMX™ Technology 233 MHz	203
Pentium® with MMX™ Technology 200 MHz	182
Pentium® with MMX™ Technology 166 MHz	160

100 150 200 250 300

ABIT Intellecta 300 Multimedia PC

Intel 300MHz Pentium® II processor

ABIT Jumperless Mother Board

64MB SDRAM

AGP (4M SGRAM)

4.3 GB HDD

3.5" Diskette Drive

16-Bit PnP Sound Card

32X CD-ROM

17" Monitor

The Intel Inside® Logo Pentium® are registered trademarks
MMX™ is a trademark of Intel Corporation

ABIT Computer Corporation 3F No. 79-7, Sec. 1, Hsin Tai Wu Rd. Hsi-Chi, Taipei Hsien, Taiwan, R.O.C. Tel: 886-2-2698-1888 Fax: 886-2-2698-1811 Web Site: <http://www.abit.com.tw> E-Mail: market@abit.com.tw

Choose 100 at www.pcmag.com/infolink



A SIGN FROM THE WISDOM

ABIT INTELLECTA 300 PC BRING YOU INTO A NEW ERA



ABIT
Your Reliable Partner



iCOMP® Index 2.0

iCOMP® Index 2.0 compares the relative performance of different Intel microprocessors

PROCESSORS	SPEED RATING
Pentium® II300 MHz	332
Pentium® II266 MHz	303
Pentium® II233 MHz	267
Pentium® with MMX™ Technology 233 MHz	203
Pentium® with MMX™ Technology 200 MHz	182
Pentium® with MMX™ Technology 166 MHz	160

100 150 200 250 300

ABIT Intellecta 300 Multimedia PC

Intel 300MHz Pentium® II processor
ABIT Jumperless Mother Board
64MB SDRAM
AGP (4M SGRAM)
4.3 GB HDD
3.5" Diskette Drive
16-Bit PnP Sound Card
32X CD-ROM
17" Monitor

The Intel Inside® Logo Pentium® are registered trademarks
MMX™ is a trademark of Intel Corporation

ABIT Computer Corporation 3F No. 79-7, Sec. 1, Hsin Tai Wu Rd. Hsi-Chi, Taipei Hsien, Taiwan, R.O.C. Tel: 886-2-2698-1888 Fax: 886-2-2698-1811 Web Site: <http://www.abit.com.tw> E-Mail: market@abit.com.tw

Choose 100 at www.pcmag.com/infolink

All about drives

Built into every motherboard are disk drive interfaces: floppy, hard disk and CD-ROM. This allows each drive to directly access the PCI bus for high-speed transfers. Aside from the usual 5.25- and 3.5-inch floppy drives, some of the latest motherboards also support the new 120MB floppy from Sony, called the LS120. These 3.5-inch drives use media nearly identical in size and shape to the current 3.5-inch high-density floppies, and are also backward compatible. So you can read and write to both the current 3.5-inch, 1.44MB floppies as well as the new, higher density 120MB floppies.

Your hard disk drive accesses the motherboard directly through the on-board EIDE (Enhanced IDE) controller. EIDE lets you access larger disk drives and create a single, large partition on a 2GB drive. And, by implementing EIDE on the motherboard, your data has direct access to the faster PCI bus. With direct PCI bus access comes faster data transfers and PIO (Program Input/Output) mode hard disks. All current motherboards support PIO transfers, including modes 3 and 4, which represent 11MB/sec and 16MB/sec transfer rates. But even with this high speed, throughput isn't fast enough for some of today's more intensive applications. Enter Ultra33, a new transfer mode that rivals SCSI and can fire data out at the remarkable speed of 33MB/sec — but only if both your hard disk and motherboard support it.

Your motherboard also supports other disk drive interfaces like CD-ROM and SCSI. Most CD-ROM drives use an extension of the EIDE hard disk standard called ATAPI that allows the motherboard and system BIOS to recognize the large, read-only CD-ROM disk. SCSI (small computer system interface) has been around for many years, but has just recently had a surge of acceptance and use on PCs. This interface is more universal than EIDE — or just about any other disk drive interface — but is also a bit more complicated, and consequently more expensive, to install.

AGP

Just recently announced is AGP, the Intel fostered graphics interface, that all new Pentium II motherboards will support. AGP, the advanced graphics port, will remove your graphics accelerator from the PCI bus and locate it onto the system bus. This provides a direct path from the CPU to the graphics accelerator and will give faster and more full-featured on-screen graphics.

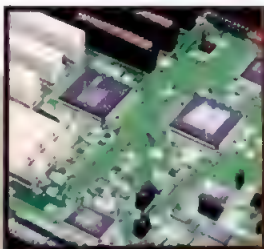
Your motherboard provides the pathway between all expansion devices and the CPU/memory. Called buses, these pathways connect disk drives to expansion boards, graphics cards to modems, and all components to the CPU. Two of the most often used buses are the ISA and PCI buses. Nearly all of your expansion boards reside on the 16-bit ISA bus. Motherboard and system manufacturers maintain this legacy design for its backwards compatibility. The PCI (peripheral connect

interface) is a more recent development designed with a wider 32-bit data path and the capacity for plug-and-play. With PCI-based boards, installation is usually a snap, aided by the additional intelligence of the PCI bus.

Of course, once you've input all of your data, you want some way to get this information back out. That's where the motherboard's input/output (I/O) ports come in. Your printer connects directly to the motherboard via its parallel port and your modem uses the motherboard's serial port. Each of these ports works differently, but you can effectively attach one device to each. The latest I/O development, universal serial bus (USB), lets you connect multiple devices to one port, and daisy chain those devices as needed. With USB, you can connect your mouse to your keyboard, and your keyboard to your monitor. One cable from the monitor connects each of these devices to the motherboard, freeing your work space of unsightly cables.

The future is today

As CPU vendors develop more powerful processors, motherboard manufacturers will follow with faster and more capable designs. Bus speeds will increase, reducing the disparity between the processor's speed and the expansion bus. You may even see new and more efficient expansion bus designs that will allow those boards to operate at faster and faster speeds.



If you think of a CPU as the computer's brain, then the motherboard is its heart.

You are also seeing increased integration of what was expansion board technology. More and more motherboards include some form of on-board sound processing and a graphics accelerator. High-end motherboards may include a SCSI disk controller and some form of network interface. With these components on the motherboard you'll need fewer expansion boards, making for a less problematic hardware installation.

With all of these advances, there are still some areas for concern, for example the year 2000 (Y2K) and its ramifications on your computer. The Y2K issue hinges on whether your PC hardware will recognize the new date. Your motherboard's BIOS controls this, and with programmable BIOS chips, such as EPROM or Flash, Y2K issues are not a problem. For older motherboards that don't support programmable BIOS chips, you'll need to replace the chip with a Y2K compliant-version.

At the heart of every computer is the motherboard, that essential connecting web of electronics that's always forgotten. But like any other complex entity, the heart is not only necessary, it is the entity that keeps everything else running smoothly.



Make the great leap into the future!

* The Intel Inside Logo and Pentium are registered trademarks and MMX is a trademark of Intel Corporation.

* Specifications are subject to change without notice.

MITAC



Global Resources Serving Individual Needs

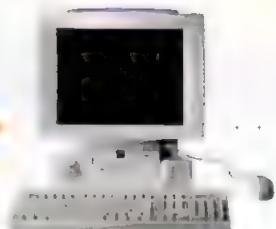
For OEM/Distribution business, please contact:

Mitac International Corp.

NO. 40, Wen Hua 2nd Rd., Kuei San Hsiang, Taoyuan, Taiwan

Tel: 886-3-3289000 Fax: 886-3-3280926

E-Mail: market@smtpink.mic.com.tw



We bring you tomorrow's PC today

When you choose to sell or own MITAC ECO, you know you're settling for a computer of the future.

MITAC ECO is blazing the trail not only on how desktop personal computers will look like in the 21st century but also how they'll help bring the consumer a lot of benefits.

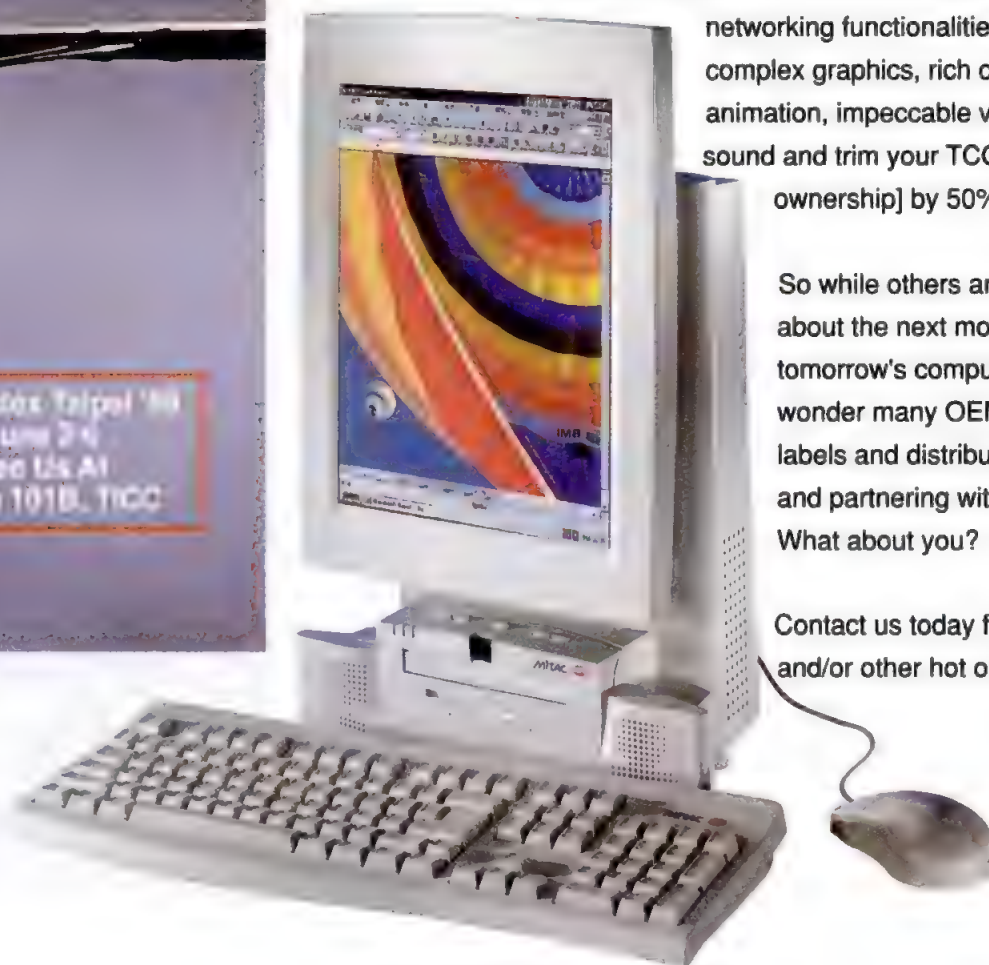
ECO is light, easy to assemble/disassemble & upgrade, saves space, energy, and the consumer's pocket. Emitting no harmful electromagnetic waves, it's the environment's godsend.

Sleek on the outside, MITAC ECO is equally appealing on the inside, featuring Intel 333 MHz Pentium® II processor.

Then it supports 256 megs of RAM, 4 of VRAM, 20X CD-ROM, 3D graphics and sound, 512 KB of cache, and networking functionalities also. So you get complex graphics, rich color, smooth animation, impeccable video, majestic sound and trim your TCO [total cost of ownership] by 50%.

So while others are still thinking about the next move, we bring you tomorrow's computer today. No wonder many OEMs/ODMs/private labels and distributors are excited and partnering with us already. What about you?

Contact us today for this product and/or other hot ones like it.



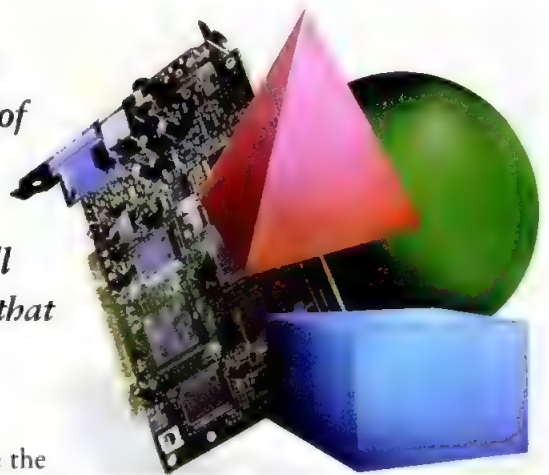
Computer Taipei '99
June 24
Eco Us At
Room 101B, TICC



GRAPHIC CARDS:

STYLE AND SUBSTANCE

Someday, you may be able to taste, smell or feel your way around your computer, but for most of us, computing remains a visual experience with an occasional sound effect. Graphics cards, safely tucked away in a motherboard slot, fill your monitor with the wealth of visual information that defines your computing experience.



Graphics cards have evolved considerably since the days of the first VGA accelerator, but the basic components remain unchanged. Every graphics card contains an accelerator chip that can take arcane computer instructions and turn them into lines, curves, and colors; a set of memory chips to store the results; and a DAC (Digital to Analog Converter) that translates the digital information into a form that your analog monitor can display.

The graphics card must work in concert with your monitor. The key parameters are resolution and refresh rate. If your monitor tops out at a resolution of 1024 x 768 pixels and a vertical refresh rate of 60 Hz, buying a graphics card with a super-fast DAC and enough memory to display true color graphics at 1280 x 1024 pixels is a waste of money. Plug-and-Play monitors and

graphics cards can negotiate the proper refresh rate and resolution combinations, but you need to match the two components' capabilities to get the most bang for your buck. Most current multi-scanning monitors can handle a 75 Hz vertical refresh rate at all resolutions up to 1024 x 768 pixels, but many low-cost graphics cards can output true-color graphics at resolutions up to 1600 x 1200 pixels and refresh rates in excess of 100 Hz.

Memory

The next issue to resolve is the amount of memory the card should have. The amount of memory necessary to form a full screen of graphics data is linked to the number of colors and the resolution that your

graphics card can support. At VGA resolution, for example, your monitor displays 640 x 480 (or 307,200) pixels every time the screen is refreshed. To support 256 simultaneous colors (or 8 bits/pixel) at this resolution, you need a frame buffer of 307,200 x 8 (or 2,457,600) bits, which is roughly

If your monitor tops out at a resolution of 1024 x 768 pixels and a vertical refresh rate of 60 Hz, buying a graphics card with a super-fast DAC and enough memory to display true color graphics at 1280 x 1024 pixels is a waste of money.

ASUS®

NEW

P2B Series

F

Features & Benefits

440BX

Mainboard

100MHz

440BX Provides 100MHz System Bus

**Upgrades System Performance
from 66MHz to 100MHz**

Supports Pentium® II 233-400MHz

Full Range of Pentium® II Family Support

Enhanced ACPI Features for Win98/PC98

**Highest Power Savings Capability and
Compatibility with Win98 and PC98 Approval**

New Anti Boot Virus BIOS

**Most Brilliant Safeguard in Your BIOS,
Ensuring You of a Virus-Free System**

Latest Ultra2 SCSI

**Double Data Transfer Efficiency
by Speeding SCSI Devices from
40MB/sec to 80MB/sec**

**100/10Mbps LAN Supports
Wake-On-LAN Feature**

**Sharply Reduces Total Cost of
Ownership with the Most
Reliable Remote Control LAN**



P2B

B

- * 100MHz System Bus (FSB)
- * Supports Pentium® II 233-400MHz
- * Enhanced ACPI Features
- * New Anti Boot Virus BIOS

asic

**Enhanced ACPI BIOS
Latest Intel 440BX AGPset**

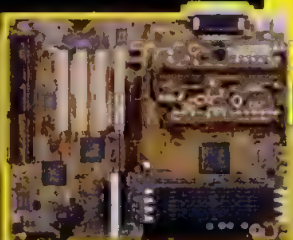
- * 100MHz System Bus (FSB)
- * Supports Pentium® II 233-400MHz
- * Adaptec® 80MB/sec AIC7890 Ultra2 SCSI
- * Intel 82558 100/10Mbps LAN Controller
- * Enhanced ACPI Features
- * New Anti Boot Virus BIOS



P2B-LS

P

erformance
**80MB/sec Ultra2 SCSI
100Mbps LAN with Wake-On-LAN Capability**



P2B-DS

P

- * 100MHz System Bus (Front Side Bus)
- * Supports Dual Pentium® II 233-400MHz
- * Adaptec® 80MB/sec AIC7890 Ultra2 SCSI
- * Enhanced ACPI Features
- * New Anti Boot Virus BIOS

rofessional

**Dual Pentium® II Power
80MB/sec Ultra2 SCSI**



ASUSTeK COMPUTER INC.

ASUSTeK COMPUTER INC.
150 Li-Ta Road, Peitou, Taipei, Taiwan, R.O.C.
TEL 886-2-2894-3447 FAX 886-2-2894-3449
http://www.asus.com.tw



The Freedom to Upgrade

Smart & Cool!

Smart- To protect your investment, ASUS is the first company in the world to offer a modular-design notebook PC that offers upgradability. By changing the modules, you can easily upgrade from:

1. Pentium® Processor with MMX™ Technology to Pentium® II Processor
2. 2D Graphics to 3D Graphics with DVD/MP3/CD Play Back
3. CD-ROM drive to DVD Drive
4. 64MB to 128MB
5. 2GB to 4GB Hard Drive

Cool- For your professional style, ASUS Notebook PC, Ice Series, maintains elegant sleek and feather-light exterior, plus, the unique anti-static cooling system, ensuring reliability & prolonged battery life.



The Intel Inside logo and Pentium are registered trademarks and MMX is a trademark of Intel Corporation

ASUS Notebook PC 6300 Series

ASUS 6320

- 13.3" XGA TFT Color Display
- 266MHz Intel Pentium® II Processor
- 80MB SDRAM (Expandable to 144MB)
- 128-bit 2MB Graphic Accelerator w/ 64K Colors
- 4.0GB Hard Drive With UltraDMA Supported
- 24X CD-ROM Module
- Modular 3.5" Diskette Drive
- Unique PC Health Monitoring
- Modular Video/ Graphic Design
- Optional DVD+MPEG2 ~~\$399~~
- 32-bit PC CardBus & Zoom Video™ Supported
- 19mm Full Size Auto-tilt-up Keyboard
- USB, NTSC/PAL Video & MIDI/Game Port
- Integrated 16-bit Sound & Stereo Speakers
- Deluxe Leather Carrying Case

\$3,499

All Systems bundled with MS Windows 95 and ASUS Utility Software.

ASUS 6323

- 13.3" XGA TFT Color Display
- 233MHz Intel Pentium® Processor with MMX™ Technology
- 32MB SDRAM (Expandable to 144MB)
- 128-bit 2MB Graphic Accelerator w/ 64K Colors
- 3.2 GB Hard Drive With UltraDMA Supported
- 24X CD-ROM Module
- Modular 3.5" Diskette Drive
- Modular Video/ Graphic Design
- Optional DVD+MPEG2 ~~\$399~~
- 32-bit PC CardBus & Zoom Video™ Supported
- 19mm Full Size Auto-tilt-up Keyboard
- Li-ion Battery Pack with a Battery Life of 5 hours
- USB, NTSC/PAL Video & MIDI/Game Port
- Integrated 16-bit Sound & Stereo Speakers
- Deluxe Leather Carrying Case
- Upgrade to 266MHz Pentium® Processor ~~\$150~~

\$2,849



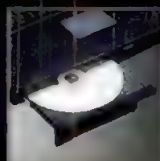
Smart & Cool !



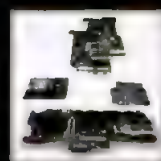
■ Keyboard
Auto-Tilt-Up



■ Stack-type PC
Cards Sockets



■ Storage
Device Bay



■ Full - modular
PCBs Design

Please contact the following distributors:

Tech Data

TEL: 1-800-2378931

MERISEL

TEL: 1-800-6374735

ASI

TEL: 1-800-2000274



ASUS COMPUTER INTERNATIONAL

8737 Mowry Ave Mowry Business Center
Bldg. 2 Newark, CA 94560
Tel: (510) 739-3777 Fax: (510) 606-4555
MFG: www.asus.com

Choose 218 at www.pcmag.com/intolink

The best of today's graphics boards combine top-notch 2D and 3D graphics acceleration, support for new output devices such as 3D glasses and can also handle digital video.

300 KB. At 24 bits/pixel ("true color" mode), you need a minimum of 900 KB to display true color graphics at VGA resolution. Those numbers can rise very quickly — at a resolution of 1024 x 768 pixels, which is ideal for today's low-cost 17" monitors, true-color 2D graphics require a minimum of 2 MB. 3D graphics are even more memory-intensive. As a general rule of thumb, 3D needs 4 times as much memory as 2D, but in truth, the realism of a 3D scene is directly related to the amount of memory available to display it. To run a 3D application at 1024 x 768 pixels in 16-bit color mode, you should have 8 MB of graphics memory. Graphics cards based on Intel's AGP bus can access system memory for some 3D tasks, which reduces the need for on-board memory.

Bandwidth Rules!

This leads us to the first rule of graphics hardware: Bandwidth — defined as the amount of information that can move along a given data path — rules! The bandwidth between the CPU/memory system

and the graphics card is limited chiefly by the type of bus connection. The old 16-bit ISA bus could only pass about 2.5 MB/sec between the CPU and the graphics card. The PCI-bus specification provides 30 to 100 MB/sec

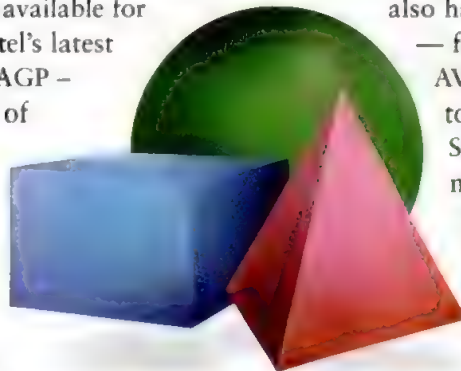
by allowing clock speeds to 33MHz and a wider, 32-bit path, but that's not nearly fast enough for real-time 3D, and other devices, such as network, SCSI or IDE controllers, can take over the bus temporarily, further reducing the bandwidth available for 3D graphics. Intel's latest bus-solution — AGP — addresses some of these issues by removing the graphics card from the PCI bus and giving it direct access to system memory at clock rates up to 133MHz. Since AGP was designed to be a single point-to-point connection, contention between other devices is no longer an issue, and AGP-based graphics cards can achieve burst rates of 533 MB/sec. Refinements such as sideband addressing and multiple instruction pipelines mean that AGP-based cards can use system memory to store and retrieve complex texture maps

in real-time. The result, as 3D applications begin to take advantage of AGP cards' capabilities, will be more realistic 3D animation: higher resolutions, more detailed textures, better special effects. By the time Windows 98 and NT 5.0 arrive with more robust AGP support, 3D games capable of running full speed at resolutions of 1024 x 768 pixels or higher will be increasingly common.

Graphics for the future

The best of today's graphics boards combine top-notch 2D and 3D graphics acceleration, support for new output devices such as 3D glasses, and can also handle digital video — from standard AVI and MPEG files to DVD streams. Several cards on the market can double as low-cost video capture devices; others can output directly to standard TV monitor, easing integration with home entertainment centers.

As graphics cards' capabilities advance, 3D and video will become more fully integrated into desktop applications such as internet browsers and presentation packages. Eventually, even spreadsheets and word processing documents will acquire 3D characteristics, and video applications such as PC-based video conferencing may finally take off.



Not just another pretty case!



- ✿ Max. Res. 1600 X 1200 NI
- ✿ .25mm Stripe Pitch
- ✿ OSD (on screen display)

Our futuristic design has minimized bulk, improved EMI shielding and reduced heat build-up through improved airflow, which extends the life of the monitor, and yes it's pretty.

Shamrock Peripherals, Inc., a leading monitor manufacturer, has been selected by Mitsubishi to utilize their newest Diamondtron™ CRT technology in it's line of **Rocketron** series monitors. The Shamrock **Rocketron C708** monitor is extremely color accurate, has virtually zero reflectivity, exceptional clarity and displays images so realistic, you'll swear you can touch them. Don't buy a monitor until you view one of these.

Whether you are using CAD, graphic design, multimedia, video production, desktop publishing or any other visually demanding applications, you will hardly believe your eyes when you see how this monitor displays high resolution images with absolute clarity.

The new Shamrock **Rocketron C708** monitor with the Diamondtron™ tube is the ultimate display solution that surpasses any other monitor in its price range on the market today!

Pick a Shamrock monitor, it's clearly the brilliant choice.

Call today for the name and location of a distributor nearest you.



SHAMROCK

Shamrock Peripherals, Inc.

462 Vista Way, Milpitas, CA 95035
(888) 801-8899 • Fax (408) 934-9051
www.shamrockusa.com

Ultimate System Armor

TOP Tech.

(Thermal Overheat Protection Technology)

MSI's latest stunning technology, the TOP (Thermal Overheat Protection) Tech, arm your system with an ultimate protection from deviated CPU temperature detection!

100MHz FSB:

Support all Intel Pentium® II processor up to 450MHz

PC Alert:

Provide your system information on:

- Temperature (CPU, System)
- Voltage (CPU, Power Supply)
- Fan (CPU, System, Power Supply)
- HDD Statistics
- Memory Statistics
- Chassis Intrusion

TOP Tech.:

Report CPU Temperature to System
Accurately, preserve system stability & life span

SoftCooler:

Cool down your CPU effectively without adding burden on your system performance

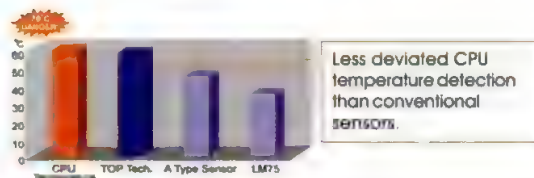
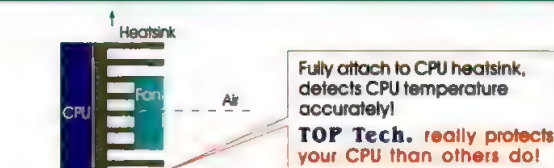
CPU Plug & Play:

BIOS provides frequency and core/bus ratio settings for users to select from.

TOP Tech.

Thermal Overheat Protection Technology

- Accurately report CPU temperature to system, preserve system stability & life span
- Less deviated CPU temperature detection than conventional sensors (**TOP Tech.: Less than 10%, A Type Sensor: 30%, LM75: 58%**)
- **Lower cost** than NS LM75, greatly enhance price competitiveness
- **Less RMA risk** due to soft mechanism



MSI Official Website



PC Alert

System Hardware Monitor Software

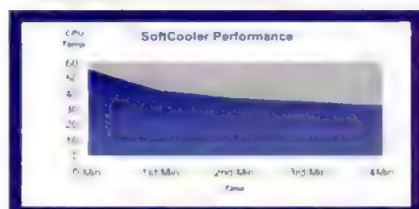
- Detect following PC hardware status during real time operation:
 - Temperature (CPU, System)
 - Voltage (CPU, Power Supply)
 - Fan (CPU, System, Power Supply)
 - Disk Statistics
 - Memory Statistics
 - Chassis intrusion
- Automatically detects language of O.S. and install proper language accordingly
- Available in 7 languages:
 - English, Chinese (Traditional & Simplified), German, French, Russian, Japanese
- Provide error log file for trouble shooting

SoftCooler

Software CPU Cooling Device

- Cool down your CPU temperature effectively without adding further hardware
- System performance not affected
- Build-in in PC Alert system hardware monitor software

CPU 33% Cooler in 1st minute!



MS-6120

Intel® 440BX AGPset ATX Mainboard

SCSI



- **CPU:** Dual Intel Pentium® II processor up to 450MHz
- **Memory:** 4 DIMM Max. 512MB SDRAM, or 1GB registered SDRAM (Support ECC & EC)
- **SCSI:** Adaptec® 7895 Chipset. Provide 2 Ultra Wide SCSI & 1 Ultra SCSI connectors. Transfer rate up to 40MB/s
- **I/O:** 2 Serial, 1 Printer, 2 USB ports, Floppy, IrDA
- **BIOS:** ACPI, DMI, PnP, Green
- **Slot:** 2 ISA, 5 PCI and 1 AGP. 30cmx25cm, ATX

MS-6119

Intel® 440BX AGPset ATX Mainboard



- **CPU:** Intel Pentium® II processor up to 450MHz or faster
- **Memory:** 3 DIMM. Max. 384MB, or 768MB registered SDRAM (Support ECC)
- **I/O:** 2 Serial, 1 Printer, 2 USB ports, Floppy, IrDA (register)
- **BIOS:** ACPI, DMI, PnP, Green
- **Slot:** 3 ISA, 4 PCI and 1 AGP. 30cmx18.6cm, ATX

3D AGPhantom



MS-4419

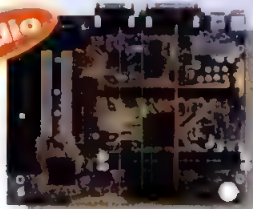
Intel® i740

- AGP support 133MHz clock, faster than all products in high performance 3D
- Complete VIDEO-IN & TV-OUT NTSC/PAL Solution (Option)
- High speed SDRAM with 8MB
- Resolution up to 1280x1024x64K COLORS (8MB), or 1600x1200x256 COLORS
- MPEG-1/2 Playback video accelerator
- Support VMI port to connect VMI compatible device
- Support OpenGL ICD spec.
- Geometry processor enhance 3D performance
- Support ACPI, Fully Microsoft PC98 compliant
- Polygon-based with 2 buffer

MS-6123

Intel® 440EX AGPset Micro ATX Mainboard

Audio

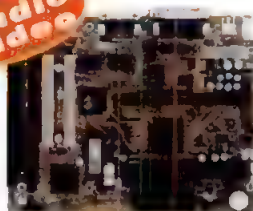


- **CPU:** Intel Pentium® II processor up to 333MHz
- **Memory:** 2 DIMM Max. 256MB SDRAM or EDO DRAM (Support ECC & EC)
- **Audio:** YAMAHA® YMF715, provide 1 MIDI/Joystick, 1 Line-out, 1 Lin-In, 1 Mic in connectors
- **I/O:** 2 Serial, 1 Printer, 2 USB ports, Floppy, IrDA
- **BIOS:** ACPI, DMI, PnP, Green
- **Slot:** 2 ISA, 2 PCI and 1 AGP. 24.4cmx19cm, Micro ATX

MS-6126

Intel® 440EX AGPset Micro ATX Mainboard

Audio Video



- **CPU:** Intel Pentium® II processor up to 333MHz
- **Memory:** 2 DIMM Max. 256MB SDRAM or EDO DRAM
- **Audio:** YAMAHA® YMF715, provide 1 MIDI/Joystick, 1 Line-out, 1 Lin-In, 1 Mic in connectors
- **Video:** ATI® Rage II C with 2MB SGRAM (Optional 4MB)
- **I/O:** 2 Serial, 1 Printer, 2 USB ports, Floppy, IrDA
- **BIOS:** ACPI, DMI, PnP, Green
- **Slot:** 2 ISA, 2 PCI, one PCI and ISA is shared. 24.4cmx19cm, Micro ATX

MS-5169

Ali Aladdin V Chipset ATX Mainboard

100



- **CPU:** 75-300MHz or faster Pentium® Processor with MMX™ Technology, AMD® K6, Cyrix® M2, IBM® 6x86
- **Clock:** Support up to 100MHz
- **Memory:** 3 DIMM. Max. 768MB SDRAM (100MHz)
- **Cachable Size:** 755MB
- **I/O:** 2 Serial, 1 Printer, 2 USB ports, Floppy, IrDA
- **BIOS:** Build-in TrendMicro's TCAV (Trend-Chip-Away-Virus) Anti-Virus Software. ACPI, DMI, PnP, Green
- **Slot:** 3 ISA, 4 PCI, 1 AGP. 30cmx18.6cm, ATX

CONCERTO I/II Series

MS-5201/MS-5202

- Support Intel® 75 to 266MHz Pentium® Processors and Pentium® Processors with MMX™ technology, or AMD® K6 and Cyrix® M2 Processors
- SiS 5597 Chipset, compliant with PC97/ACPI
- Chassis accommodable with one FDD, one HDD and one CD-ROM
- Chassis provides 1 security lock to preserve your property
- Back panel support one VGA, Network (UTP), Speaker, Line-In, MIC-In, LPT, PS/2 Mouse and Keyboard, Dual USB Port
- Support Modem Ring Wake-Up, Soft Power Off, 3D Audio
- Riser Card supports 2 ISA and 1 PCI (1 ISA/PCI shared)
- Support SDRAM, 3.3V EDO DRAM, Max. 256MB memory on board
- Supports Ultra DMA33 synchronous DMA mode
- Audio: ESS 1869 Chipset
- VGA: SiS 5597 Chipset
- Network
 - MS-5201: Winbond w940 10Mbps Ethernet
 - MS-5202: Intel® i558 10/100Mbps Ethernet
- Power Supply
 - Tiger: 85W, Voltage Switchable (115V/215V)
 - Seasonic: 80W, Voltage Auto Switch
- 31.5cm x 8.5cm x 36.9cm (width x height x length)



MSI Headquarters
Micro-Star International Co., Ltd.
No. 10, Li-De Street, Jang-Hsi
City/Taipei Hsien, Taiwan
Tel: 886-2-2524-0000
Fax: 886-2-2524-0001
E-mail: service@msi.com.tw
http://www.msi.com.tw

China
Micro-Star International
Co., Ltd.
Tel: 86-21-6391-0000
Fax: 86-21-6391-0001

France
MSI Computer S.A.R.L.
Tel: 33-1-6937-0811
Fax: 33-1-6937-0808
E-mail: france@msi.com

Germany
MSI Computer Vertrieb
GmbH
Tel: 49-69-404-0000
Fax: 49-69-404-0001
E-mail: germany@msi.com

Japan
Micro-Star Corp.
Tel: 81-3-5281-0000
Fax: 81-3-5281-0001
E-mail: japan@msi.com

USA
MSI Computer Corp.
Tel: 1-818-252-0000
Fax: 1-818-252-0001
E-mail: usa@msi.com

Choose 245 at www.pcmag.com/infolink

Splendor of 3D Glamour



Silicon Integrated Systems Corp.

USA: 1-408-721-6000 Germany: 49-89-9915090 Taiwan: 886-2-29161619
Fax: 1-408-721-6000 Fax: 49-89-99150950 Fax: 886-2-29161618
Choose S.I.S. at www.sis.com.tw <http://www.sis.com.tw>

SIS

Power to the Core

FontViewer Shows All

Browse through all of your system's fonts, compare them, and find the one you're looking for.

By Jake Richter

Word processors and desktop publishing packages offer an abundance of snazzy-looking fonts, but they don't offer a simple way to browse through the fonts. Windows itself offers some font utilities, but they are limited. The Character Map lets you view and access the character sets of each font installed on your system; the Control Panel's Fonts applet lets you install and remove fonts and view samples. But neither lets you view different fonts simultaneously so you can compare them.

This limitation is especially irksome when you need to identify a mystery font. Let's say you need a large, smooth version of a company logo to be ready for printing at the end of the day, but the logo designer is off backpacking in the Himalayas and has left no record of what font she used. With the tools built into Windows, your only option is to scrutinize each font on your system laboriously until you find a match.

This issue's free utility, FontViewer, lets you browse all the fonts on your system at once, compare selected fonts with each other, and use a variety of filters to find the font you want quickly. FontViewer, which was written with Microsoft Visual C++ 5.0, runs under Windows 95 and Windows NT 4.0. You can get your copy from PC Magazine Online or by mail (see the sidebar "How to Get the Files" for details). The source code for FontViewer is also available for those who are interested.

USING FONTVIEWER

To install FontViewer, copy its three program files—Fontview.exe, Fontview.hlp, and Fontview.cnt—to the folder of your choice. The

program does not require access to the registry or any system files, and it can be run from any folder. To remove FontViewer from your system, simply delete its program files.

When you first launch FontViewer, you'll see a list of font names on the left side of the window and a sample of each font on the right (see the screenshot below). FontViewer separates the fonts on your system into two main categories: TrueType and bitmap/other. TrueType fonts are stored as sets of rules, and they

1 fonts, which are designed for use on multiple platforms.

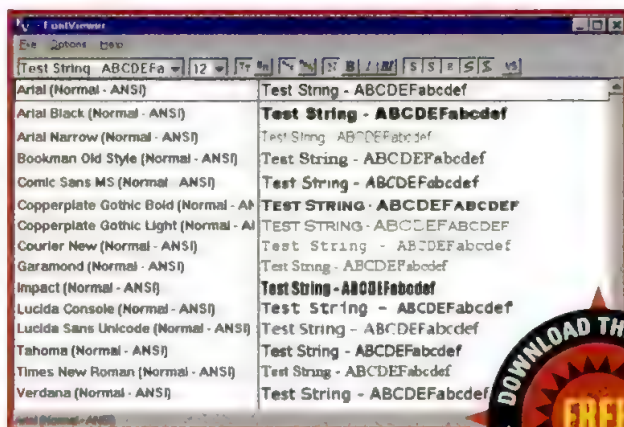
FontViewer's toolbar gives fast access to filters that let you control which fonts the utility displays. These controls are also available through the *Options | Display Settings* menu option, which can be quickly accessed by pressing F2. The first toolbar control lets you select the test string displayed to the right of each font name. You can select one of three preconfigured strings or enter your own string of up to 50 characters. The next control lets you change the size of the font used in the test string. Note that because of a variety of font nuances, every font renders differently and there can be visible differences in height among fonts that were all rendered at a specific point size.

Next on the toolbar is a pair of buttons for telling FontViewer to display TrueType fonts, bitmap/other fonts, or both. Since all fonts fall into one of these two categories, at least one of them must be selected.

The next pair of toolbar buttons lets you select what character sets to display. Different character sets are needed for languages that use different alphabets. There are over a

dozen and a half different character sets defined for use in Windows, but FontViewer uses a simplified grouping of just two categories: ANSI and non-ANSI. The ANSI character set is used to represent the Latin alphabet, used for English and Western European languages. The non-ANSI group encompasses everything else. By default, FontViewer shows only the ANSI character set. (Note that the ANSI designation is entered manually by the font designer. There is nothing to prevent a font designer from labeling a symbol character set as ANSI.)

All non-Unicode character sets contain a maximum of 256 characters. The first 128 characters are for the Latin alphabet, numbers, and other standard characters, except in certain symbol and decorative fonts. The



FontViewer displays a list of font names on the left side of the window and a sample of each font on the right. It lets you browse all the fonts on your system at once, compare selected fonts with one another, and use a variety of filters to find the font you want quickly.



can be scaled to any size while maintaining a smooth shape. The TrueType standard also provides a way for Windows programs to access detailed information about a font.

Bitmapped fonts are defined pixel by pixel for one or more predefined sizes, and they cannot be scaled smoothly. They were the first type of font available on computers, but they are used infrequently today. FontViewer's bitmap/other category also includes non-TrueType scalable fonts such as Adobe Type

For Programmers Only FontViewer is a 32-bit Windows application written in C++ with MFC. It can be compiled with Microsoft Visual C++ 5.0. FontViewer's source code is available on PC Magazine's Web site (www.pcmag.com) and demonstrates several interesting programming techniques, including how to:

- inventory all the fonts on a system;
- add ellipses to a combo box displaying overlong strings;
- manually implement list selection using the mouse.

Support Help for PC Magazine's free utilities can be obtained in our online discussion areas, both on the World Wide Web (www.pcmag.com/discuss.htm) and on ZDNet in the Utilities section of ZDNet's Tips Forum (GO ZNT:TIPS). The authors of current utilities generally visit this forum daily. You may find an answer to your question simply by reading the messages posted in the forum. If the author is not available and the forum sysops can't answer your question, the Utilities column editor, who also checks this forum each day, will contact the author for you.

second 128 characters (the “high” characters) are for different things, depending on the type of character set. In ANSI character sets, the high characters are for accented Latin characters used in Western languages other than English. In non-ANSI character sets, the high characters are often for alternative alphabets, such as those used for Russian or Eastern European languages.

When you look at non-ANSI character sets in FontViewer’s main window, you won’t see non-ANSI characters in the test string unless you’ve created a special test string that uses high characters. Alternatively, you can view a font’s character set by placing the mouse over the font, right-clicking to bring up the context menu, and then choosing *Show Character Set*. You can also bring up this display by clicking on the font to select it and then choosing *Options | Show Character Set* from the pull-down menu.

FontViewer displays character sets in a 16-by-16-character grid. Though all character sets define a continuous range of at most 256 characters, not all cells within this range need to be defined. FontViewer grays out the cells for characters not included in the font and uses a default character (usually a rectangle or line) for undefined characters.

If you want to view only the most commonly used characters, select *Show Alphanumeric*. This will show the uppercase and lowercase letters, all ten digits, and a sample of various punctuation marks. For a symbol font, this option shows the characters or symbols at the positions corresponding to the letters and numbers of a text font.

You can control the style in which a font is rendered (normal, bold, italic, or bold italic) using the next set of toolbar buttons. Depress multiple buttons to select multiple font styles for display. At least one of the style buttons must be selected: If you try to disable all the style variations, FontViewer will display an error message.

If the font is TrueType, FontViewer can obtain descriptive details about the font and let you use these attributes as filters. (Like the ANSI designation, this information is provided manually by the font designers.) The five attribute filters are next on the toolbar: *Sans Serif*, *Serif*, *Fixed Space*, *Script*, and *Decorative & Other*.

A serif font—for example, Courier or Times New Roman—has little extrusions at the tips of each character. The term *sans serif* (meaning *without serifs*) refers to fonts that lack these extrusions—for example, Arial or the System font.

Fixed-space fonts, such as Courier, allot a fixed amount of horizontal space for each character. They are useful when you need to

line up columns of numbers. Variable-space fonts, such as Times New Roman, allot a varying amount of horizontal space for each character depending on what it needs. (For example, the letter *i* takes up less space than the letter *w*.)

Script fonts are designed to look like cursive handwriting. And the last FontViewer category, *Decorative & Other*, includes all manner of unique-looking and special-purpose fonts.

The final button on the toolbar is *VS*, which stands for *view selected*. This feature lets you compare a selected subset

```
#define FNT_TRUETYPE 0x0001
#define FNT_BITMAP 0x0002
#define FNT_ANSI 0x0004
#define FNT_NONANSI 0x0008
#define FNT_PLAIN 0x0010 // Same as Normal
#define FNT_BOLD 0x0020
#define FNT_ITALIC 0x0040
#define FNT_BOLDITAL 0x0080
#define FNT_SANSERIF 0x0100
#define FNT_SERIF 0x0200
#define FNT_MODERN 0x0400 // Same as fixed space
#define FNT_SCRIPT 0x0800
#define FNT_OTHER 0x1000
#define FNT_DISPLAY 0x8000 // Flags a font for
                             // display
```

FIGURE 1: FontViewer uses a set of 14 bit flags to store the characteristics of each font on the system.

of the fonts on your system. If you move the mouse across the font-display window, you’ll see a focus rectangle follow the mouse up and down, surrounding each font in turn. You can use standard item-selection controls, such as a left mouse-button click, to select a single entry. Selected fonts are highlighted in reverse color. Hold the Ctrl key while clicking to select or deselect a font without affecting other font selections. You can also select a font, then hold down the Shift key and click on another font, to select a range. Once you’ve selected the fonts you want, click on the *VS* button to display only those fonts you’ve selected. The *View Selected* command is also available from the Options menu.

When you have finished selecting the fonts that interest you and adjusting the test string to your liking, you can print the font names and sample strings by selecting *File | Print* from the pull-down menu. If the test string is too long to fit on the page, it will be cut off. Also, the *Print* command will print whatever is currently viewable by scrolling the font window, so be careful with this function when displaying lots of fonts. Otherwise you may end up with many pages of unwanted printout.

THE INNER WORKS

FontViewer is a single-document interface (SDI) Microsoft Foundation Classes (MFC) application, with a number of special twists to accommodate its unique display requirements. FontViewer must inventory all the fonts on the system and then render each font into one or more styles. It depends heavily on the display device and display context to do this, so most of the work takes place in the CView-derived class, CFontViewView.

The CFontViewView class is initialized when FontViewer is loaded. It is here that the *OnInitDialog()* method inventories the system for all the installed fonts. This is done by means of the *EnumFontFamiliesEx()* API function, which in turn calls a callback routine within FontViewer for each font in the system.

The font-enumeration callback routine, *EnumerateMyFonts()*, examines information on each font and stores the data in the CFontNode class, an object

defined by FontViewer that acts as a linked-list node. For each font on the system, the API function *EnumFontFamiliesEx()* calls *EnumerateMyFonts()*, passing the font information structures LOGFONT and TEXTMETRICS. The *EnumerateMyFonts()* routine extracts the information that FontViewer needs from these two structures, packages it up in a CFontNode structure, and adds that node to a linked list.

The *EnumerateMyFonts()* function analyzes the font information supplied by Windows and uses a 16-bit mask to indicate the presence or absence of 14 different features (see Figure 1). When the user sets particular filters using the toolbar buttons or the Display Settings dialog, FontViewer uses this mask (which I call the *face flag*) to determine whether that font should be displayed.

As with any standard SDI MFC application, all drawing is done in the *OnDraw()* function of the CView descendant. Since FontView must programmatically control the vertical scrollbar, it needs to know how many fonts are in the display list, and that number can change drastically when the user changes the font filters. To avoid the need to recalculate the number of valid fonts every time the client window is redrawn, I developed *CFontViewView::FilterFonts()*, which compares the



AOPEN MOTHERBOARDS

THE HEART OF QUALITY PCs



Your High-Performance PC Solution

If you want a superior-quality PC, ask for motherboards from AOpen. As the component manufacturer of a \$6.5 billion group with more than 600 patents, AOpen has one of the most extensive, aggressively-priced motherboard product lines in the world. Every AOpen motherboard is Microsoft PC 95®, PC 97®, and PC 98® compatible, Novell® NetWare certified and Year 2000 compliant.

AOpen is proud of over 22 years of experience designing and manufacturing high-performance systems at ISO 9001 qualified facilities. AOpen also manufactures a complete line of fully-integrated components ranging from CD-ROM, CD-RW, multi-media, audio and graphics cards to fax/modems, networking and video conferencing.

Let AOpen solve *your* PC quality and reliability puzzle.



For More Information Call

1-888-332-6736

<http://www.aopenusa.com>

current control settings to each font node in the linked list. When it finds a font that matches the control settings, it sets the `FNT_DISPLAY` flag in that font node's face flag and increments a counter. Then the `OnDraw()` method displays the fonts that have the display bit set in their nodes' face flags. It displays from one to four lines, depending on which styles (normal, bold, italic, bold italic) are selected. `FilterFonts()` is called whenever a control is changed, ending with a call to `Invalidate()` to force a redraw of the client area via `OnDraw()`.

RESIZING COMBO BOXES

FontViewer accepts up to 50 characters in the displayed string combo box, but the combo box is wide enough to display only about 20 characters. That by itself isn't much of a problem: Longer strings get clipped. But the clipping is ugly. Instead, I wanted to end each string longer than 20 characters with an ellipsis (...) in the drop-down list box, to indicate that there was more. This turned out to be rather complicated. If I changed the contents of the list-box portion by replacing the end of a string with an ellipsis and if the user selected that list-box entry, the ellipsis would appear in the edit portion of the combo box instead of the full string.

I found a solution when I realized that it matters what is in the list-box entries only when the user causes the list-box portion of the combo box to drop down. When hidden, the list box can contain anything—a string with an ellipsis or one with no ellipsis. I created an array of strings in the `CFVToolBar` class that contained the complete, nonellipsis version of the list-box strings, and then I intercepted four messages generated by the combo box:

```
CBN_SELCHANGE  
CBN_EDITCHANGE  
CBN_DROPDOWN  
CBN_SETFOCUS
```

These messages are processed in the `CFontViewView` class in `FontViewer`. `CBN_SELCHANGE` notifies `FontViewer` when a list-box entry in the combo box has been selected.

When processing this message, `CFontViewView` determines which entry has been selected, grabs the corresponding full string, and tells the combo box to replace the string for the selected entry with the full string. This causes the full string to appear in the edit-box portion of the combo box.

`CBN_EDITCHANGE` notifies `FontViewer` when the contents of the edit box have been changed. Since changes can be made while the list box is extended, I needed to have

FontViewer is a
time-saving utility for
finding the perfect font
for your needs.

FontViewer display an ellipsis in the potentially exposed list box when the user types the actual string in the edit box. I did this by taking advantage of the `SetWindowText()` function, which, in the case of a combo box, sets the contents of the edit box. I had to follow this with a call to set the selection area in the edit box to a single position. This set the proper cursor position in the edit box.

`CBN_DROPDOWN` notifies `FontViewer` when the user requests a drop-down of the list box. When this occurs, `CFontViewView` must parse all the strings and add ellipses to those that are too long. I used the `SetWindowText()` trick described above to update the edit box with the full version of the currently selected list-box string.

`CBN_SETFOCUS` is issued when the combo box gains focus. When `FontViewer` receives this message, it updates the edit box with the currently active list-box entry.

SELECTING FONTS

One other task that gave me headaches in `FontViewer` was setting up the left-mouse-click multiple-selection mechanism. Two

aspects were problematic. The first was that since I needed a splitter bar between the font names and test strings, I couldn't use the obviously preferable approach of making the font list just a really large variable-height, owner-drawn list box with built-in support for selecting with the mouse or keyboard. Instead, I had to manually handle the mouse and keyboard input for selection.

The second problem stemmed from the fact that a single node in the font list can be represented by as many as four lines in the display (that is, for normal, bold, italic, and bold italic) and that each of these lines can be selected independently. To mark specific styles of a given font as selected, I added a bit-flag field called `m_selected` to each node. The `CFontViewView::OnDraw()` function checks the face flag to determine which styles are to be drawn, then checks `m_selected` for each style to determine how it should be drawn (whether it should be selected or not).

The first problem (that of having to implement the multiple-select functionality manually) was solved in the `CFontViewView::OnLButtonDown()` function, where three click conditions are parsed: no modifier, Shift key pressed, and Ctrl key pressed. The Shift key has higher priority than the Ctrl key, so it doesn't matter if both keys are pressed at the same time as the mouse button. Note that the selection behavior in `FontViewer` is an enhancement of the standard. You can use the Ctrl key to select fonts discontinuously, then use the Shift key to add a range of fonts to the selection.

FontViewer is a time-saving utility for finding the perfect font for your needs. For programmers, `FontViewer` provides insight into how fonts are located and rendered and how to trick a combo box into displaying what you want, when you want. **PC**

Jake Richter writes about graphics and technology from his Caribbean island home. His e-mail address is jake@richterscale.org. Sheryl Canter is the editor of the Utilities column and a contributing editor of PC Magazine.

www.pcmag.com

How to Get the Files Here's how you can access PC Magazine Online, where you'll find all our utilities and other PC Tech files.

VIA THE INTERNET You can obtain PC Magazine utilities and issue archives of all PC Tech files at www.pcmag.com; at the home page click on *Downloads*. You can also get the files through anonymous FTP from <ftp.zdnet.com>. (The utilities and archives are compressed with PKZIP, Version 2.04.)

VIA COMPU SERVE To join ZDNet/CompuServe (formerly Ziff-Net), call 800-895-4596 (voice) and request the PMZ offer. CompuServe members can join ZDNet by typing GO ZIFFMEM at any CompuServe ! prompt. You can

get the current utility by typing GO FREEUTIL at any CompuServe ! prompt. Other PC Tech files are available individually, in the Utilities / Tips Forum, and bundled within volume archive files.

BY FAX OR MAIL If you don't have a modem or Internet access, you can fax 978-772-7133 or write to PC Magazine Utilities, c/o Image Software Services, 67 Buena Vista St., Ayer, MA 01432-5030.

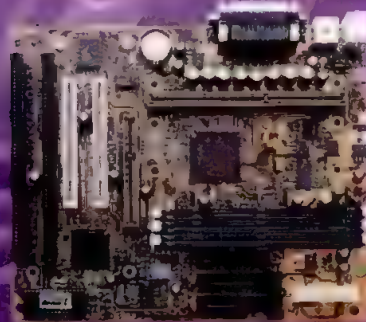
The programs presented in PC Magazine are copyrighted and cannot be copied or modified for any purpose, except that a single copy may be made for archival purposes. Use of the programs is subject to the terms and conditions of the license agreement distributed with the programs.

New BX, EX, AGP Series

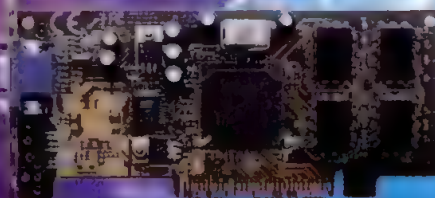
Enlighten The World Into Speedy Colorful, and Commodity Era.



- GA-600BX1**
- Intel 440BX AGPset
 - Slot 1 & Slot 3AGP Support
 - Slot 1 & 3AGP Support for
 - 3 DIMMs up to 1GB DRAM
 - Power on by Keyboard, PS/2 Mouse, RTC
 - 3 level ACPI LED
 - Micro ATX Form Factor (24.5 X 13 cm)



- GA-600EX3**
- Intel 440EX AGPset
 - Slot 1 & AGP slot support
 - 3 DIMMs up to 256MB DRAM
 - Power on by Keyboard, PS/2 Mouse, RTC
 - 3 level ACPI LED
 - Micro ATX Form Factor (24.5 X 13 cm)



- GA-610 3D AGP VGA**
- Intel 740 chipset
 - Professional 3D/2D Acceleration for Windows NT & Windows 95
 - Optimized Drivers for OpenGL 1.1, Visual Basic, GDI, and much more
 - Full 2X AGP Support (AGP 1.0/1.1)
 - Full Sideband AGP Initiator Support
 - Fully-Featured 3D Functions
 - Integrated 24-bit 220MHz RAMDAC
 - Shared 16MB 2D/3D Video Memory
 - 3D/2D/1D Video Output
 - 1.2V/1.5V/1.8V/2.0V/2.5V/3.0V/3.3V/3.5V/3.6V/3.8V/4.0V/4.2V/4.5V/4.8V/5.0V/5.2V/5.5V/5.8V/6.0V/6.2V/6.5V/6.8V/7.0V/7.2V/7.5V/7.8V/8.0V/8.2V/8.5V/8.8V/9.0V/9.2V/9.5V/9.8V/10.0V/10.2V/10.5V/10.8V/11.0V/11.2V/11.5V/11.8V/12.0V/12.2V/12.5V/12.8V/13.0V/13.2V/13.5V/13.8V/14.0V/14.2V/14.5V/14.8V/15.0V/15.2V/15.5V/15.8V/16.0V/16.2V/16.5V/16.8V/17.0V/17.2V/17.5V/17.8V/18.0V/18.2V/18.5V/18.8V/19.0V/19.2V/19.5V/19.8V/20.0V/20.2V/20.5V/20.8V/21.0V/21.2V/21.5V/21.8V/22.0V/22.2V/22.5V/22.8V/23.0V/23.2V/23.5V/23.8V/24.0V/24.2V/24.5V/24.8V/25.0V/25.2V/25.5V/25.8V/26.0V/26.2V/26.5V/26.8V/27.0V/27.2V/27.5V/27.8V/28.0V/28.2V/28.5V/28.8V/29.0V/29.2V/29.5V/29.8V/30.0V/30.2V/30.5V/30.8V/31.0V/31.2V/31.5V/31.8V/32.0V/32.2V/32.5V/32.8V/33.0V/33.2V/33.5V/33.8V/34.0V/34.2V/34.5V/34.8V/35.0V/35.2V/35.5V/35.8V/36.0V/36.2V/36.5V/36.8V/37.0V/37.2V/37.5V/37.8V/38.0V/38.2V/38.5V/38.8V/39.0V/39.2V/39.5V/39.8V/40.0V/40.2V/40.5V/40.8V/41.0V/41.2V/41.5V/41.8V/42.0V/42.2V/42.5V/42.8V/43.0V/43.2V/43.5V/43.8V/44.0V/44.2V/44.5V/44.8V/45.0V/45.2V/45.5V/45.8V/46.0V/46.2V/46.5V/46.8V/47.0V/47.2V/47.5V/47.8V/48.0V/48.2V/48.5V/48.8V/49.0V/49.2V/49.5V/49.8V/50.0V/50.2V/50.5V/50.8V/51.0V/51.2V/51.5V/51.8V/52.0V/52.2V/52.5V/52.8V/53.0V/53.2V/53.5V/53.8V/54.0V/54.2V/54.5V/54.8V/55.0V/55.2V/55.5V/55.8V/56.0V/56.2V/56.5V/56.8V/57.0V/57.2V/57.5V/57.8V/58.0V/58.2V/58.5V/58.8V/59.0V/59.2V/59.5V/59.8V/60.0V/60.2V/60.5V/60.8V/61.0V/61.2V/61.5V/61.8V/62.0V/62.2V/62.5V/62.8V/63.0V/63.2V/63.5V/63.8V/64.0V/64.2V/64.5V/64.8V/65.0V/65.2V/65.5V/65.8V/66.0V/66.2V/66.5V/66.8V/67.0V/67.2V/67.5V/67.8V/68.0V/68.2V/68.5V/68.8V/69.0V/69.2V/69.5V/69.8V/70.0V/70.2V/70.5V/70.8V/71.0V/71.2V/71.5V/71.8V/72.0V/72.2V/72.5V/72.8V/73.0V/73.2V/73.5V/73.8V/74.0V/74.2V/74.5V/74.8V/75.0V/75.2V/75.5V/75.8V/76.0V/76.2V/76.5V/76.8V/77.0V/77.2V/77.5V/77.8V/78.0V/78.2V/78.5V/78.8V/79.0V/79.2V/79.5V/79.8V/80.0V/80.2V/80.5V/80.8V/81.0V/81.2V/81.5V/81.8V/82.0V/82.2V/82.5V/82.8V/83.0V/83.2V/83.5V/83.8V/84.0V/84.2V/84.5V/84.8V/85.0V/85.2V/85.5V/85.8V/86.0V/86.2V/86.5V/86.8V/87.0V/87.2V/87.5V/87.8V/88.0V/88.2V/88.5V/88.8V/89.0V/89.2V/89.5V/89.8V/90.0V/90.2V/90.5V/90.8V/91.0V/91.2V/91.5V/91.8V/92.0V/92.2V/92.5V/92.8V/93.0V/93.2V/93.5V/93.8V/94.0V/94.2V/94.5V/94.8V/95.0V/95.2V/95.5V/95.8V/96.0V/96.2V/96.5V/96.8V/97.0V/97.2V/97.5V/97.8V/98.0V/98.2V/98.5V/98.8V/99.0V/99.2V/99.5V/99.8V/100.0V/100.2V/100.5V/100.8V/101.0V/101.2V/101.5V/101.8V/102.0V/102.2V/102.5V/102.8V/103.0V/103.2V/103.5V/103.8V/104.0V/104.2V/104.5V/104.8V/105.0V/105.2V/105.5V/105.8V/106.0V/106.2V/106.5V/106.8V/107.0V/107.2V/107.5V/107.8V/108.0V/108.2V/108.5V/108.8V/109.0V/109.2V/109.5V/109.8V/110.0V/110.2V/110.5V/110.8V/111.0V/111.2V/111.5V/111.8V/112.0V/112.2V/112.5V/112.8V/113.0V/113.2V/113.5V/113.8V/114.0V/114.2V/114.5V/114.8V/115.0V/115.2V/115.5V/115.8V/116.0V/116.2V/116.5V/116.8V/117.0V/117.2V/117.5V/117.8V/118.0V/118.2V/118.5V/118.8V/119.0V/119.2V/119.5V/119.8V/120.0V/120.2V/120.5V/120.8V/121.0V/121.2V/121.5V/121.8V/122.0V/122.2V/122.5V/122.8V/123.0V/123.2V/123.5V/123.8V/124.0V/124.2V/124.5V/124.8V/125.0V/125.2V/125.5V/125.8V/126.0V/126.2V/126.5V/126.8V/127.0V/127.2V/127.5V/127.8V/128.0V/128.2V/128.5V/128.8V/129.0V/129.2V/129.5V/129.8V/130.0V/130.2V/130.5V/130.8V/131.0V/131.2V/131.5V/131.8V/132.0V/132.2V/132.5V/132.8V/133.0V/133.2V/133.5V/133.8V/134.0V/134.2V/134.5V/134.8V/135.0V/135.2V/135.5V/135.8V/136.0V/136.2V/136.5V/136.8V/137.0V/137.2V/137.5V/137.8V/138.0V/138.2V/138.5V/138.8V/139.0V/139.2V/139.5V/139.8V/140.0V/140.2V/140.5V/140.8V/141.0V/141.2V/141.5V/141.8V/142.0V/142.2V/142.5V/142.8V/143.0V/143.2V/143.5V/143.8V/144.0V/144.2V/144.5V/144.8V/145.0V/145.2V/145.5V/145.8V/146.0V/146.2V/146.5V/146.8V/147.0V/147.2V/147.5V/147.8V/148.0V/148.2V/148.5V/148.8V/149.0V/149.2V/149.5V/149.8V/150.0V/150.2V/150.5V/150.8V/151.0V/151.2V/151.5V/151.8V/152.0V/152.2V/152.5V/152.8V/153.0V/153.2V/153.5V/153.8V/154.0V/154.2V/154.5V/154.8V/155.0V/155.2V/155.5V/155.8V/156.0V/156.2V/156.5V/156.8V/157.0V/157.2V/157.5V/157.8V/158.0V/158.2V/158.5V/158.8V/159.0V/159.2V/159.5V/159.8V/160.0V/160.2V/160.5V/160.8V/161.0V/161.2V/161.5V/161.8V/162.0V/162.2V/162.5V/162.8V/163.0V/163.2V/163.5V/163.8V/164.0V/164.2V/164.5V/164.8V/165.0V/165.2V/165.5V/165.8V/166.0V/166.2V/166.5V/166.8V/167.0V/167.2V/167.5V/167.8V/168.0V/168.2V/168.5V/168.8V/169.0V/169.2V/169.5V/169.8V/170.0V/170.2V/170.5V/170.8V/171.0V/171.2V/171.5V/171.8V/172.0V/172.2V/172.5V/172.8V/173.0V/173.2V/173.5V/173.8V/174.0V/174.2V/174.5V/174.8V/175.0V/175.2V/175.5V/175.8V/176.0V/176.2V/176.5V/176.8V/177.0V/177.2V/177.5V/177.8V/178.0V/178.2V/178.5V/178.8V/179.0V/179.2V/179.5V/179.8V/180.0V/180.2V/180.5V/180.8V/181.0V/181.2V/181.5V/181.8V/182.0V/182.2V/182.5V/182.8V/183.0V/183.2V/183.5V/183.8V/184.0V/184.2V/184.5V/184.8V/185.0V/185.2V/185.5V/185.8V/186.0V/186.2V/186.5V/186.8V/187.0V/187.2V/187.5V/187.8V/188.0V/188.2V/188.5V/188.8V/189.0V/189.2V/189.5V/189.8V/190.0V/190.2V/190.5V/190.8V/191.0V/191.2V/191.5V/191.8V/192.0V/192.2V/192.5V/192.8V/193.0V/193.2V/193.5V/193.8V/194.0V/194.2V/194.5V/194.8V/195.0V/195.2V/195.5V/195.8V/196.0V/196.2V/196.5V/196.8V/197.0V/197.2V/197.5V/197.8V/198.0V/198.2V/198.5V/198.8V/199.0V/199.2V/199.5V/199.8V/200.0V/200.2V/200.5V/200.8V/201.0V/201.2V/201.5V/201.8V/202.0V/202.2V/202.5V/202.8V/203.0V/203.2V/203.5V/203.8V/204.0V/204.2V/204.5V/204.8V/205.0V/205.2V/205.5V/205.8V/206.0V/206.2V/206.5V/206.8V/207.0V/207.2V/207.5V/207.8V/208.0V/208.2V/208.5V/208.8V/209.0V/209.2V/209.5V/209.8V/210.0V/210.2V/210.5V/210.8V/211.0V/211.2V/211.5V/211.8V/212.0V/212.2V/212.5V/212.8V/213.0V/213.2V/213.5V/213.8V/214.0V/214.2V/214.5V/214.8V/215.0V/215.2V/215.5V/215.8V/216.0V/216.2V/216.5V/216.8V/217.0V/217.2V/217.5V/217.8V/218.0V/218.2V/218.5V/218.8V/219.0V/219.2V/219.5V/219.8V/220.0V/220.2V/220.5V/220.8V/221.0V/221.2V/221.5V/221.8V/222.0V/222.2V/222.5V/222.8V/223.0V/223.2V/223.5V/223.8V/224.0V/224.2V/224.5V/224.8V/225.0V/225.2V/225.5V/225.8V/226.0V/226.2V/226.5V/226.8V/227.0V/227.2V/227.5V/227.8V/228.0V/228.2V/228.5V/228.8V/229.0V/229.2V/229.5V/229.8V/230.0V/230.2V/230.5V/230.8V/231.0V/231.2V/231.5V/231.8V/232.0V/232.2V/232.5V/232.8V/233.0V/233.2V/233.5V/233.8V/234.0V/234.2V/234.5V/234.8V/235.0V/235.2V/235.5V/235.8V/236.0V/236.2V/236.5V/236.8V/237.0V/237.2V/237.5V/237.8V/238.0V/238.2V/238.5V/238.8V/239.0V/239.2V/239.5V/239.8V/240.0V/240.2V/240.5V/240.8V/241.0V/241.2V/241.5V/241.8V/242.0V/242.2V/242.5V/242.8V/243.0V/243.2V/243.5V/243.8V/244.0V/244.2V/244.5V/244.8V/245.0V/245.2V/245.5V/245.8V/246.0V/246.2V/246.5V/246.8V/247.0V/247.2V/247.5V/247.8V/248.0V/248.2V/248.5V/248.8V/249.0V/249.2V/249.5V/249.8V/250.0V/250.2V/250.5V/250.8V/251.0V/251.2V/251.5V/251.8V/252.0V/252.2V/252.5V/252.8V/253.0V/253.2V/253.5V/253.8V/254.0V/254.2V/254.5V/254.8V/255.0V/255.2V/255.5V/255.8V/256.0V/256.2V/256.5V/256.8V/257.0V/257.2V/257.5V/257.8V/258.0V/258.2V/258.5V/258.8V/259.0V/259.2V/259.5V/259.8V/260.0V/260.2V/260.5V/260.8V/261.0V/261.2V/261.5V/261.8V/262.0V/262.2V/262.5V/262.8V/263.0V/263.2V/263.5V/263.8V/264.0V/264.2V/264.5V/264.8V/265.0V/265.2V/265.5V/265.8V/266.0V/266.2V/266.5V/266.8V/267.0V/267.2V/267.5V/267.8V/268.0V/268.2V/268.5V/268.8V/269.0V/269.2V/269.5V/269.8V/270.0V/270.2V/270.5V/270.8V/271.0V/271.2V/271.5V/271.8V/272.0V/272.2V/272.5V/272.8V/273.0V/273.2V/273.5V/273.8V/274.0V/274.2V/274.5V/274.8V/275.0V/275.2V/275.5V/275.8V/276.0V/276.2V/276.5V/276.8V/277.0V/277.2V/277.5V/277.8V/278.0V/278.2V/278.5V/278.8V/279.0V/279.2V/279.5V/279.8V/280.0V/280.2V/280.5V/280.8V/281.0V/281.2V/281.5V/281.8V/282.0V/282.2V/282.5V/282.8V/283.0V/283.2V/283.5V/283.8V/284.0V/284.2V/284.5V/284.8V/285.0V/285.2V/285.5V/285.8V/286.0V/286.2V/286.5V/286.8V/287.0V/287.2V/287.5V/287.8V/288.0V/288.2V/288.5V/288.8V/289.0V/289.2V/289.5V/289.8V/290.0V/290.2V/290.5V/290.8V/291.0V/291.2V/291.5V/291.8V/292.0V/292.2V/292.5V/292.8V/293.0V/293.2V/293.5V/293.8V/294.0V/294.2V/294.5V/294.8V/295.0V/295.2V/295.5V/295.8V/296.0V/296.2V/296.5V/296.8V/297.0V/297.2V/297.5V/297.8V/298.0V/298.2V/298.5V/298.8V/299.0V/299.2V/299.5V/299.8V/300.0V/300.2V/300.5V/300.8V/301.0V/301.2V/301.5V/301.8V/302.0V/302.2V/302.5V/302.8V/303.0V/303.2V/303.5V/303.8V/304.0V/304.2V/304.5V/304.8V/305.0V/305.2V/305.5V/305.8V/306.0V/306.2V/306.5V/306.8V/307.0V/307.2V/307.5V/307.8V/308.0V/308.2V/308.5V/308.8V/309.0V/309.2V/309.5V/309.8V/310.0V/310.2V/310.5V/310.8V/311.0V/311.2V/311.5V/311.8V/312.0V/312.2V/312.5V/312.8V/313.0V/313.2V/313.5V/313.8V/314.0V/314.2V/314.5V/314.8V/315.0V/315.2V/315.5V/315.8V/316.0V/316.2V/316.5V/316.8V/317.0V/317.2V/317.5V/317.8V/318.0V/318.2V/318.5V/318.8V/319.0V/319.2V/319.5V/319.8V/320.0V/320.2V/320.5V/320.8V/321.0V/321.2V/321.5V/321.8V/322.0V/322.2V/322.5V/322.8V/323.0V/323.2V/323.5V/323.8V/324.0V/324.2V/324.5V/324.8V/325.0V/325.2V/325.5V/325.8V/326.0V/326.2V/326.5V/326.8V/327.0V/327.2V/327.5V/327.8V/328.0V/328.2V/328.5V/328.8V/329.0V/329.2V/329.5V/329.8V/330.0V/330.2V/330.5V/330.8V/331.0V/331.2V/331.5V/331.8V/332.0V/332.2V/332.5V/332.8V/333.0V/333.2V/333.5V/333.8V/334.0V/334.2V/334.5V/334.8V/335.0V/335.2V/335.5V/335.8V/336.0V/336.2V/336.5V/336.8V/337.0V/337.2V/337.5V/337.8V/338.0V/338.2V/338.5V/338.8V/339.0V/339.2V/339.5V/339.8V/340.0V/340.2V/340.5V/340.8V/341.0V/341.2V/341.5V/341.8V/342.0V/342.2V/342.5V/342.8V/343.0V/343.2V/343.5V/343.8V/344.0V/344.2V/344.5V/344.8V/345.0V/345.2V/345.5V/345.8V/346.0V/346.2V/346.5V/346.8V/347.0V/347.2V/347.5V/347.8V/348.0V/348.2V/348.5V/348.8V/349.0V/349.2V/349.5V/349.8V/350.0V/350.2V/350.5V/350.8V/351.0V/351.2V/351.5V/351.8V/352.0V/352.2V/352.5V/352.8V/353.0V/353.2V/353.5V/353.8V/354.0V/354.2V/354.5V/354.8V/355.0V/355.2V/355.5V/355.8V/356.0V/356.2V/356.5V/356.8V/357.0V/357.2V/357.5V/357.8V/358.0V/358.2V/358.5V/358.8V/359.0V/359.2V/359.5V/359.8V/360.0V/360.2V/360.5V/360.8V/361.0V/361.2V/361.5V/361.8V/362.0V/362.2V/362.5V/362.8V/363.0V/363.2V/363.5V/363.8V/364.0V/364.2V/364.5V/364.8V/365.0V/365.2V/365.5V/365.8V/366.0V/366.2V/366.5V/366.8V/367.0V/367.2V/367.5V/367.8V/368.0V/368.2V/368.5V/368.8V/369.0V/369.2V/369.5V/369.8V/370.0V/370.2V/370.5V/370.8V/371.0V/371.2V/371.5V/371.8V/372.0V/372.2V/372.5V/372.8V/373.0V/373.2V/373.5V/373.8V/374.0V/374.2V/374.5V/374.8V/375.0V/375.2V/375.5V/375.8V/376.0V/376.2V/376.5V/376.8V/377.0V/377.2V/377.5V/377.8V/378.0V/378.2V/378.5V/378.8V/379.0V/379.2V/379.5V/379.8V/380.0V/380.2V/380.5V/380.8V/381.0V/381.2V/381.5V/381.8V/382.0V/382.2V/382.5V/382.8V/383.0V/383.2V/383.5V/383.8V/384.0V/384.2V/384.5V/384.8V/385.0V/385.2V/385.5V/385.8V/386.0V/386.2V/386.5V/386.8V/387.0V/387.2V/387.5V/387.8V/388.0V/388.2V/388.5V/388.8V/389.0V/389.2V/389.5V/389.8V/390.0V/390.2V/390.5V/390.8V/391.0V/391.2V/391.5V/391.8V/392.0V/392.2V/392.5V/392.8V/393.0V/393.2V/393.5V/393.8V/394.0V/394.2V/394.5V/394.8V/395.0V/395.2V/395.5V/395.8V/396.0V/396.2V/396.5V/396.8V/397.0V/397.2V/397.5V/397.8V/398.0V/398.2V/398.5V/398.8V/399.0V/399.2V/399.5V/399.8V/400.0V/400.2V/400.5V/400.8V/401.0V/401.2V/401.5V/401.8V/402.0V/402.2V/402.5V/402.8V/403.0V/403.2V/403.5V/403.8V/404.0V/404.2V/404.5V/404.8V/405.0V/405.2V/405.5V/405.8V/406.0V/406.2V/406.5V/406.8V/407.0V/407.2V/407.5V/407.8V/408.0V/408.2V/408.5V/408.8V/409.0V/409.2V/409.5V/409.8V/410.0V/410.2V/410.5V/410.8V/411.0V/411.2V/411.5V/411.8V/412.0V/412.2V/412.5V/412.8V/413.0V/413.2V/413.5V/413.8V/414.0V/414.2V/414.5V/414.8V/415.0V/415.2V/415.5V/415.8V/416.0V/416.2V/416.5V/416.8V/417.0V/417.2V/417.5V/417.8V/418.0V/418.2V/418.5V/418.8V/419.0V/419.2V/419.5V/419.8V/420.0V/420.2V/420.5V/420.8V/421.0V/421.2V/421.5V/421.8V/422.0V/422.2V/422.5V/422.8V/423.0V/423.2V/423.5V/423.8V/424.0V/424.2V/424.5V/424.8V/425.0V/425.2V/425.5V/425.8V/426.0V/426.2V/426.5V/426.8V/427.0V/427.2V/427.5V/427.8V/428.0V/428.2V/428.5V/428.8V/429.0V/429.2V/429.5V/429.8V/430.0V/430.2V/430.5V/43

The Everything Bagel.

Poppy Seeds

Onion

Garlic

Sesame Seeds

Salt

The Everything Computer Shopping Site.

The screenshot shows the NetBuyer website with the following callouts:

- LATEST PRICES** (points to the 'NetBuyer News' section)
- THOUSANDS OF PRODUCTS** (points to the 'Shop!' section)
- SIDE BY SIDE COMPARISONS** (points to the 'Spotlight' section)
- POP-UP REVIEWS** (points to the 'Specials' section)
- ALL YOUR FAVORITE VENDORS** (points to the 'System Configurators' section)
- INTERACTIVE HELP SCREENS** (points to the 'NetBuyerbase' section)
- NEW! BARGAIN BASEMENT** (points to the 'WIN \$500' banner)

www.netbuyer.com

When you hunger for value in computer products, go right to the super-site that has everything — **www.netbuyer.com**.

Here you'll get it all: thousands of tempting products from the widest selection of vendors, reviews to chew over while you shop,

interactive screens to help you narrow your choices, specs you can line up side by side, current prices plus exclusive deals you can't find anywhere else! What more could you want? Come sink your teeth into computer shopping at its best. Enjoy!

NetBuyer. From COMPUTER SHOPPER and ZDNet.

**Y'know that little help icon on your computer?
Now it's a whole channel.**



Your Computer Channel

The calvary's on its way. Introducing ZDTV,™ the cable channel devoted exclusively to computing and the Internet. Tune in for shows like "Call For Help"™ and really get connected to your computer. Or explore the best of the web on "Internet Tonight."™ Call your cable or satellite provider today and ask for ZDTV. Just say "ZDTV Me." Or visit us at www.zdtv.com.

Many thanks to our charter sponsors:

Charles Schwab

COESEL

DELL

Garmin

IBM

Microsoft

Intel

MONITOR

ORACLE

SIEBEL

Sun

VERITAS

**Just when you thought you couldn't possibly
get any more out of this**



there's this.



The Benchmark

www.pcmag.com

If you want more information about a product in PC Magazine, and you want it fast, check out InfoLink – our new online product index and information request service – at www.pcmag.com/infolink. You can use it to get additional information on any of the products written about or advertised in PC Magazine, and have that information sent any way you like – e-mail, postal mail, or a telephone call. Plus, with InfoLink, you can link directly to vendors' Web sites.

InfoLink is your personal link to the most comprehensive product information available anywhere. Get connected at www.pcmag.com/infolink today.

User-to-User

BY NEIL J. RUBENKING

Easily Start a Group of Files

Here's a Windows 95 technique that makes it easy to launch several programs simultaneously. It's also easy to change the programs that are launched. Create a folder (for example, C:\Ezstart) on your hard disk, and place shortcuts to your programs in this folder. In some other folder, create the following batch file:

```
@ECHO OFF
FOR %%V IN (C:\Ezstart\*.*) DO START
%%V
```

The second line applies the START command to each file in the Ezstart folder. You might think that START C:\Ezstart*. * could be used instead of the FOR command. However, it appears that the START command doesn't accept wildcards. The command START C:\Ezstart*. * simply returns an error message.

Now create a shortcut to the batch file on your desktop. Double-click the shortcut to launch all of the programs in your Ezstart folder. To add or remove programs, simply add or delete shortcuts in the C:\Ezstart folder. You may wish to change the batch file shortcut's properties to make it run minimized and automatically close on exit.

PETE KLIMEK
Berkeley, California

PC MAGAZINE: As noted above, the START command does not accept wildcards. You must specify the precise filename to be launched. The file can be a program, or any file type associated with a specific program. For example, on most systems

START README.TXT

would load Readme.txt into NotePad. And as this tip shows, if the file is a shortcut (a file with extension .LNK), START will launch the file pointed to by the shortcut.

The easiest way to populate your Ezstart folder with shortcuts is to use drag-and-drop in Explorer. Explorer's default behavior when you drag and drop with the left mouse button varies, depending on the file type and on whether the new location is on a different drive from the old. Cut through any possible confusion by dragging with the right mouse button instead. When you drop the icon onto the Ezstart folder, you'll get a pop-up menu of choices; select *Create shortcut(s) here*.

The batch file described above isn't actual-

ly necessary; you can create a shortcut that executes the FOR command directory. Right-click the desktop, select *New* from the menu, and then select *Shortcut*. In the resulting Create Shortcut dialog, enter:

```
COMMAND /C FOR %%V IN (C:\Ezstart\*.*)
DO START %%V
```

Press *Next* and enter a name for this shortcut, then press the *Finish* button. That's all you have to do!

Dial-Up Networking Supports Redial

I never knew you could get Windows 95's Dial-Up Networking to redial automatically when the line was busy, but I recently discovered how to do this. In the Registry under HKEY_CURRENT_USER, in the folder RemoteAccess, you can activate the redial function by changing EnableRedial from 00 00 00 00 to 00 00 00 01 and then specifying the number of redials in RedialTry from 1 (01 00 00 00) to 99 (63 00 00 00).

DYLAN TAYLOR
Carbondale, Illinois

PC MAGAZINE: If Dial-Up Networking fails to connect with your Internet service provider on the first try, naturally you'd like it to try again. Fortunately, you can enable redial for Dial-Up Networking without editing the Registry. The only tricky part is finding it. Start Windows Explorer and select the Dial-Up

Networking folder in the left-hand pane. Note that a new top-level menu item named *Connections* appears when this folder is selected and disappears when you select any other folder.

When you choose *Settings* from this menu, you'll see the dialog shown in Figure 1 or something similar. Check the box to enable redial, set the number of retries, and specify how long the system should wait between tries. Click the *OK* button and you're done. From now on, if your ISP doesn't answer on the first ring, the system will try again, and again, and again....

Fast Restart for Windows 95

Restarting Windows 95 is normally a four-step process: Click on the Start button, select Shut Down, click on the Restart the computer? button, and then click on OK. You can make it a one-step process by creating an icon on your desktop that restarts Win 95.

- Open Notepad and type @exit.
- Save the document with a .bat extension.
- Create a shortcut to the file by using the right mouse button to drag it to the desktop and then selecting *Create Shortcut(s) Here*.
- Right-click on the shortcut and select *Properties*.
- Click on the *Program* tab and check the *Close on Exit* box.
- Click on the *Advanced* button.
- Make sure *MS-DOS mode* is selected and *Warn before entering MS-DOS mode* is not selected.
- Click on the *OK* button twice.

- Give your new shortcut a unique icon and name.

From now on, whenever you double-click on this icon, Win 95 will restart—no questions asked.

ADRIAN PANG
Richmond, BC, Canada

PC MAGAZINE: I'm sure that somewhere out there, there are a few lucky users who never have to restart Windows 95. The rest of us are blessed with a need to restart on a more or less frequent basis. Perhaps a necessary application crashes regularly, leaving a data file locked. Four steps to restart Windows 95 don't seem like a lot, but when you're forced to restart frequently due to system problems, they're as annoying as 40. At such times, just launch your fast-restart icon!

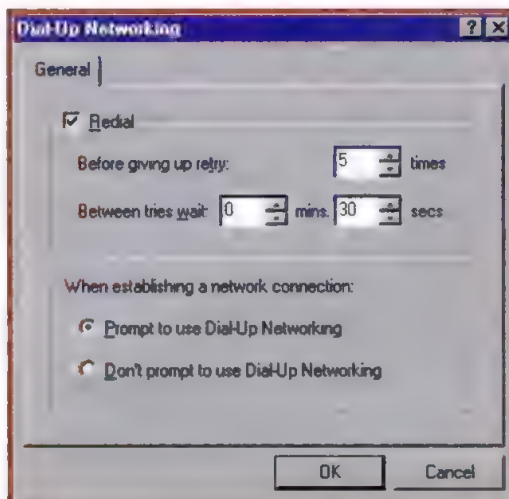


FIGURE 1: The Windows Explorer menu choice that invokes this handy dialog is visible only when the Dial-Up Networking folder is open.

Networking

Call us for all your networking needs



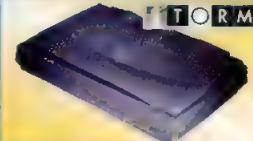
Intel InBusiness
5-Port 10Base-T Hub
 • Create your own small 10BASE-T Ethernet network • Easy installation • Additional crossover port
\$64.99 (ITE SH10TUS)

InBusiness 8-Port 10Base-T Hub
 (ITE SH10T8US) **\$89.99**

InBusiness 4-Port 10Base-T Hub
 (ITE SH10T4US) **\$199.99**

Internet Station
 (ITE SR10T5US) **\$399.99**

Storm Scanners



Storm TotalScan
Color Flatbed Scanner
 • 1200 x 600 dpi optical/9600 dpi enhanced • 30-bit color • Scan area up to 8.5" x 11.7" • ClearScan II & ClearPrint • 256 gray scales & b/w • Auto JPEG • Parallel port installation
\$149.99 (SRM TOTALSCAN)

EasyPhoto ImageWave (parallel)
 (SRM IMAGEWAVE) **\$99.99**

EasyPhoto SmartPage Pro (parallel)
 (SRM SMARTPAGEPR) **\$149.99**

Graphics Acceleration



Creative Labs
3D Blaster Voodoo2 12MB
 • 3 separate processors for max speed
\$279.99 (CLN 3DB6670)

Creative Labs 3D Blaster Voodoo2 8MB
 (CLN 3DB6671) **\$199.99**
 after \$30 mail-in rebate

Diamond Voodoo2 8MB Monster 3D II
 (DIA MON3DII1L1) **\$249.99**

Diamond Voodoo2 12MB Monster 3D II
 (DIA MON3DII2L1) **\$299.99**

J&R CORPORATE SALES BUSINESS LEASING:

No Money Down, No Payments for 30 Days!

- 1) Allows flexibility to add or upgrade equipment at any time
- 2) Conserves your capital
- 3) Credit decisions are quick and easy
- 4) Covers entire packages - equipment, software, service contracts, peripherals

*All lease payments are exclusive of applicable taxes. Minimum leasing payment is \$50 per month. All leases are subject to credit approval and require an administrative fee of \$49.95 to be billed on the first invoice. Leasing program administered by Data Commercial Credit. Loans are Business Loans, 50 down, 36 months term with \$1.00 purchase option.

Call J&R Corporate Sales
1-800-221-3191 or
1-212-238-9080
 (\$1,400 Minimum Lease Amount)

J&R COMPUTER WORLD

Corp. Leasing Available: 1-800-221-3191 (see below left)

For latest prices and availability on our huge inventory of computer products,
Shop J&R Online!
www.JandR.com
AOL Keyword: J&R

Hot New Notebooks!

IBM ThinkPad 310ED
 • 166MHz Intel® Pentium® processor with MMX™ technology
 • 12.1" DSTN color display
 • 32MB RAM
 • 2.1GB hard drive
 • 256K L2 cache
 • 20x CD-ROM drive
 • 56K PCMCIA fax/modem
\$1599.99 (IBM 2600-80U)

IBM ThinkPad 560X • Super-slim and lightweight
 • P233MHz MMX • 12.1" TFT display • 32MB RAM • 4GB hard drive • 2MB VRAM (IBM 2640-70U) **Super Price**

IBM ThinkPad 770 • 14.1" TFT active-matrix color
 • 32MB RAM • 5.1GB HD • Pentium 233MHz with MMX
 • 1024 x 768 res • Modem (IBM 9549-1AU) **Super Price**

Toshiba Libretto 50CT
 • 75MHz Intel® Pentium® processor
 • Measures only 4" x 8"
 • 6.1" TFT active-matrix
 • 16MB EDO DRAM
 • 810MB hard drive
 • 1MB video RAM
 • Comes with pre-installed Windows 95
Super Price (TOS PA1249U-T2A)

Toshiba Libretto 70CT • Weighs only 1.88 pounds!
 • Brilliant 6.1" active-matrix color • 16MB EDO RAM
 • 1.58GB hard drive (TOS PA1260U-T2A) **\$1699.99**

Toshiba Libretto 100CT • 7.1" TFT active-matrix color screen • Pentium 166MHz with MMX • 32MB RAM
 • PCI bus • 2GB hard drive (TOS PA1254U-T2A) **\$2499.99**

Toshiba Satellite 305CDS • Pentium 166MHz with MMX • 12.1" D-STN screen • 16MB RAM • 2GB hard drive
 • 16x-speed CD-ROM (TOS PA1261U-S4C) **\$1699.99**

Toshiba Satellite 315CDT • 12.1" TFT active-matrix color screen • Pentium 200MHz MMX • 32MB RAM • 2GB hard drive • 16x CD-ROM (TOS PA1262U-T6C) **\$2299.99**

Toshiba Tecra 550CDT • 12.1" TFT active-matrix
 • 1024 x 768 • P266MHz with MMX • 32MB RAM
 • 3.8GB HD • 56K modem (TOS PA1268U-T2A) **\$3799.99**

Toshiba Satellite Pro 490XCDT • 13.3" TFT screen
 • Pentium II 266MHz with MMX • 32MB EDO RAM
 • 3.8GB HD • 20x CD (TOS PA1270U-T2C) **Super Price**

Toshiba Tecra 780DVD/5G • Built-in DVD-ROM drive
 • 13.3" TFT • Pentium II 266MHz w MMX • 64MB RAM
 • 5GB HD • K56flex (TOS PA1264U-T2D) **Super Price**

Toshiba Tecra 780DVD/8G • Built-in DVD-ROM drive
 • 13.3" TFT • Pentium II 266MHz w MMX • 64MB RAM
 • 8GB HD • K56flex (TOS PA1267U-T2D) **Super Price**

The Intel Inside Logo and Pentium are registered trademarks and MMX is a trademark of Intel Corp.

Fujitsu Lifebook 735DX
 • Pentium® 133MHz with MMX™
 • 16MB EDO DRAM
 • 1.6GB hard drive
 • 12.1" DSTN color
 • 20x CD-ROM drive
 • 56K fax/modem
\$1099.99 (FUJ 7350X)

Hitachi VisionBook Plus 4140X • 12.1" STN display
LIMITED QUANTITY (HIT 4140X) **\$1099.99**

Hitachi VisionBook Plus 4350X • P150 MMX
 • 16MB RAM + FREE additional 16MB RAM!
LTD. QUANTITY (HIT 4350X) (PHY PD4011A) **\$1499.99**

Hitachi VisionBook Plus 5270 • 12.1" flat-panel HPA display • P200MHz w/MMX (HIT 5270) **\$1799.99**

Hitachi VisionBook Traveller™ 3745 • P133 MMX
 • Only 2.7 lbs. • 8.4" TFT display (HIT 3745) **\$1799.99**

Hitachi VisionBook Plus 5280 • 12.1" HPA display
 • P233MHz w/MMX • 56K modem (HIT 5280) **\$1999.99**

Hitachi VisionBook Pro™ 7560 • 13.3" XGA TFT display • 32MB RAM • 3GB hard drive • 56K modem
 • P166 MMX **LTD. QUANTITY** (HIT 7560) **\$2299.99**

Hitachi VisionBook Pro 7580 • 13.3" XGA TFT display • 32MB RAM • 4GB HD • 56K modem
 • 20x CD-ROM drive (HIT 7580-002) **\$3399.99**

Hitachi VisionBook Pro 7590 • Pentium 266 MMX
 • 13.3" XGA TFT display • 48MB RAM • 4GB HD • 56K modem
 • 20x CD-ROM (HIT 7590) **\$3799.99**

Compaq Presario 1681
 • 233MHz Intel® Pentium® with MMX™
 • 48MB SyncDRAM
 • 3GB hard drive
 • 20x-speed CD-ROM
 • 12.1" active-matrix
 • 56K fax/modem
\$2799.99 (CPQ 1681)

Compaq Armada 7330T • 12.1" active TFT display
 • P150MHz **LTD. QUANTITY** (CPQ 7330T) **\$1499.99**

Compaq Presario 1215 • 180MHz MMX-enhanced
 • 24MB RAM • 12.1" HPA display (CPQ 1215) **\$1499.99**

Compaq Presario 1710SB • P166MHz with MMX
 • 32MB RAM • 12.1" hi-res STN (CPQ 1710SB) **\$1699.99**

Compaq Presario 1220 • 200MHz MMX-enhanced
 • 32MB • 2GB HD • 12.1" HPA (CPQ 1220) **\$1699.99**

Compaq Presario 1622 • 12.1" HPA DSTN screen
 • Pentium 233MHz MMX • 32MB RAM • 3.2GB HD
 • 20x CD-ROM • 56K modem (CPQ 1622) **\$2299.99**

PNY Memory Upgrades

16MB (4 x 32, SIMM)
 (PNY 16MEG-01) **\$29.99**
 after \$10 rebate

32MB (8 x 32, SIMM)
 (PNY 32MEG-01) **\$59.99**
 after \$20 rebate

16MB (2 x 64, SyncDRAM)
 (PNY 64203ASEMCS) **\$39.99**
 after \$10 rebate

32MB (4 x 64, SyncDRAM)
 (PNY 64403ASEMCS) **\$79.99**
 after \$20 rebate

Get up to \$20 in Rebates!

8MB compact flash
 (PNY PCF008PA) **\$89.99**
 after \$10 rebate

15MB compact flash
 (PNY PCF015PA) **\$139.99**
 after \$10 rebate

30MB compact flash
 (PNY PCF030PA) **\$229.99**
 after \$20 rebate

Power Protection



Tripp Lite
675-Watt Battery Backup
 • Protects against brownouts, spikes, blackouts, surges, and line noise
 • Fax/Modem protection
\$229.99 (TRL BC-INT675)

OMNIPOWER® Battery Backup
 (TRL BC325) **\$119.99**

Internet Office 450 UPS System
 (TRL BC-INT450) **\$139.99**

Personal 500-Watt Battery Backup
 (TRL BC500PSRL) **\$179.99**

Business Software

Peachtree
One-Write Plus (7.0)
\$44.99
 after \$20 mail-in rebate for version upgrade

C Video-Mail (1.2) w/Eudora Pro 4
Cubic VideoComm **\$139.99**

Dr. Solomon's Anti-Virus Deluxe
 by Dr. Solomon's **\$59.99**

Freewwwweb
 by Freewwwweb **\$44.99**

OmniPage Pro 8 Upgr. w/Bonus
 by Caere **\$129.99**

Painter 3D
 by MetaCreations **\$259.99**

Picture Publisher 8
 by Micrografix **\$119.99**

Symantec
Act! (4.0)
\$89.99
 after \$100 mail-in rebate for comp. upgrade

PowerDesk Utilities 98 (3.0)
 by Mijenix **\$29.99**

Quicken Financial Planner (3.0)
 by Intuit **\$39.99**

Safe & Sound
 by McAfee **\$29.99**

Turbo C++ Suite
 by Borland **\$59.99**

Uninstaller (4.5)
 by CyberMedia **\$29.99**

WordPerfect Suite 8 w/Dragon
 by Corel **\$99.99**

To Order Toll Free and Receive a Free Catalogue
800-221-8180
 PARK ROW • NEW YORK • NY • 10038 FAX: 1-800-232-4432

Overnight Delivery Available!

MAIL ORDERS: J&R Computer World
 • 59-50 Queens Midtown Expressway • Maspeth, Queens NY 11378
 CALL 1-800-221-8180 for shipping information. DO NOT SEND CASH.
 Not responsible for typographical or pictorial errors. Same quantities may be limited. All merchandise is 100% guaranteed! Prices good thru 6/30/98.

Order Code: CP0526



Data Storage

SyQuest SparQ
1.0GB Removable Drive
• Comes with one 1.0GB cartridge
\$199.99 (SYQ SPARQ1 PE-01)

Imega Zip® External 100MB Drive
(BER ZIP100PAR) **\$149.99**

SyQuest SyJet® External 1.5GB Drive
(SYQ SYJET1SE 3B) **\$299.99**

Imega Jaz® Internal 1GB Drive
(BER JAZ1NTPC) **\$299.99**

Imega Jaz® External 2GB Drive
(BER JAZEXT2GIG) **\$649.99**



Digital Cameras

OLYMPUS

Olympus D-500L
Digital Zoom Camera
• 3x zoom lens (50mm-150mm)
with macro • 2MB SmartMedia
card stores 25 images • 1024 x 768
pixels • 1.8" color LCD • Comes with
Adobe PhotoDeluxe
\$799.99 (OLM D500L)

Olympus D220L (640 x 480 resolution)
(OLM D220L) **\$399.99**

Olympus D320L (1024 x 768 resolution)
(OLM D320L) **\$599.99**



Entertainment Software

Lucasfilm
**Star Wars
Rebellion**
\$49.99

Black Dahlia
by Interplay **\$46.99**

Bradshaw Football 98
by I. Hoffman **\$19.99**

Caesar's Palace: Blackjack
by Interplay **\$12.99**

Clickart Fonts
by Broderbund **\$29.99**

Complete Land Designer
by Sierra **\$46.99**

Enc. Britannica: Black History
by Broderbund **\$29.99**



Mindscape
**Complete
National
Geographic**
\$169.99

Hoyle Battling Ships and War
by Sierra **\$12.99**

Music Maker Deluxe
by Magix **\$39.99**

Rockett's Tricky Decision
by Purple Moon **\$29.99**

Sim Life Classics
by Maxis **\$12.99**

Starcraft
by Davidson **\$49.99**

Tex Murphy: Overseer
by Access **\$42.99**

J&R COMPUTER WORLD

"Good deals on everything imaginable..."

Reprinted from PC Computing, Feb. 1998 Copyright © 1998 Ziff Davis

Desktop & MiniTower PCs!

Compaq Presario 4880
• 400MHz Intel Pentium II® with MMX
• 100MHz system bus
• 64MB SDRAM
• 12GB hard drive
• 17GB DVD-ROM drive
• 4MB video RAM • Black finish
\$2599.99 (CPQ 4880)

Presario 2240 • 200MHz AMD-K6™ MMX™ enhanced
• 32MB RAM • 2.1GB hard drive (CPQ 2240) **\$749.99**

Presario 4540 • 233MHz AMD-K6™ MMX™ enhanced
• 32MB RAM • 3.2GB hard drive (CPQ 4540) **\$949.99**

Presario 4550 • 233MHz AMD-K6 MMX • Minitower
• Zip drive • 48MB RAM • 4GB HD • 24x CD-ROM
• 2MB VRAM • 56K modem (CPQ 4550) **\$1099.99**

Presario 4640 • 266MHz Intel Pentium II processor
• DVD-ROM drive • 48MB RAM • 4GB hard drive • 56K
modem • 2x AGP graphics (CPQ 4640) **\$1499.99**

Presario 4660 • 300MHz Pentium II with MMX
• 64MB SDRAM • DVD-ROM drive • 8GB hard drive
• AGP 4MB VRAM (CPQ 4660) **\$1799.99**

Presario 4860 • PII333MHz MMX • 8GB hard drive
• 64MB DRAM • 17GB DVD (CPQ 4860) **\$2299.99**

Monitors are sold separately for all desktops and minitowers.

Hewlett-Packard Pavilion 8290
• 400MHz Intel Pentium II® with MMX
• 100MHz system bus
• 64MB SDRAM
• 12GB hard drive
• 56KFlex modem
• 24x CD-ROM drive
\$2499.99 (HP 8290)

HP Pavilion 8240 • 233MHz Intel Pentium MMX
• 32MB RAM • 4GB HD • 24x CD (HP 8240) **\$999.99**

HP Pavilion 8260 • 266MHz Intel Pentium II MMX
• 32MB RAM • 4GB HD • 24x CD (HP 8260) **\$1499.99**

HP Pavilion 8275 • 300MHz Intel Pentium II MMX
• 48MB RAM • 8GB HD • DVD-2X (HP 8275) **Super Price**

HP Pavilion 8280 • 333MHz Intel Pentium II MMX
• 64MB SDRAM • 8GB HD • DVD-2X ROM drive
• 56KFlex modem • 3D sound (HP 8280) **\$2199.99**

IBM Aptiva E Series E26
• IBM® K6™
• 233MHz with MMX
• 32MB SDRAM • 3.2GB HD • 24x CD-ROM • 56KFlex
\$899.99 (IBM 2137-E26)

The Intel Inside Logo and Pentium are registered trademarks and MMX is a trademark of Intel Corp

Monitor Specials

Hewlett-Packard Pavilion 14" Display
• 13.2" VIS • SVGA
• 0.28mm dot pitch
• 1024 x 768
\$149.99 (HP D3858A)
\$119.99 with any PC system!

Hewlett-Packard Pavilion 17" Display
• 15.7" VIS • SVGA
• 0.28mm dot pitch
• 1024 x 768
\$399.99 (HP D3859A)
\$339.99 with any PC system!

Toshiba Multimedia 17" Monitor
• 15.7" viewable
image • 0.28mm dpi
• 5-watt subwoofer
and built-in speakers
• Black • 1280 x 1024
\$299.99 (TOS PV2002U-01)

NEC Monitors

A500 • 15" (13.8" VIS) Flat-square (NEC A500) **\$259.99**

E500 • 15" (13.8" VIS) ChromaClear (NEC E500) **\$299.99**

A700 • 17" (15.6" VIS) Flat-square (NEC A700) **\$479.99**

E700 • 17" (15.6" VIS) ChromaClear (NEC E700) **\$579.99**

P750 • 17" (15.6" VIS) hi-res (NEC P750) **\$769.99**

E1100 • 21" (19.8" VIS) Flat-sq (NEC E1100) **\$1099.99**

P1150 • 21" (19.8" VIS) hi-res (NEC P1150) **\$1199.99**

LCD400V • 14" (14" VIS) Flat-panel (NEC LCD400V) **\$1399.99**

LCD400 • 14" (14" VIS) active-matrix flat-panel display
with XtraView™ technology (NEC LCD400) **\$1599.99**

Sony Monitors

CPD-100ES • 15" (14" VIS) (SON 100ES) **\$299.99**

CPD-100GS • 15" (14" VIS) (SON 100GS) **\$349.99**

CPD-200ES • 17" (16" VIS) (SON 200ES) **\$549.99**

CPD-200GS • 17" (16" VIS) (SON 200GS) **\$629.99**

GDM-200PS • 17" (16" VIS) (SON 200PS) **\$759.99**

GDM-400PS • 19" (18" VIS) (SON 400PS) **\$949.99**

GDM-500PS • 21" (19.8" VIS) (SON 500PS) **\$1399.99**

Hitachi Monitors

Elite 751 • 19" (18" VIS) (HIT CH751U-S11) **\$899.99**

Elite 800 • 21" (19" VIS) (HIT CH800U) **\$1249.99**

Panasonic Monitors

P15 • 15" (14" VIS) PanaSync/Pro™ (PAN P15) **\$299.99**

S70 • 17" (16" VIS) PanaSync™ (PAN S70) **\$499.99**

SL70 • 17" (16" VIS) Short Length (PAN SL70) **\$599.99**

PF70 • 17" (15.9" VIS) PanaFlat™ (PAN PF70) **\$799.99**

E21 • 21" (20" VIS) PanaSync™ (PAN E21) **\$1199.99**

LC40 • 14" (14" VIS) PanaFlat™ LCD (PAN LC40) **\$1999.99**



V.90 Modems

U.S. Robotics
ITU Standard Internal Modem
• Supports Windows, Win95 only
\$89.99 (USR INT56KV90W)

U.S. Robotics Internal 56K V.90
(USR INT56KV90) **\$159.99**

U.S. Robotics Int. Voice 56K V.90
(USR INT56KV90VC) **\$179.99**

U.S. Robotics External 56K V.90
(USR EXT56KV90) **\$179.99**

U.S. Robotics Ext. Voice 56K V.90
(USR EXT56KV90VC) **\$249.99**



Hitachi VisionDesk
233MHz Intel® Pentium®
Processor with MMX™ technology
and Integrated Flat-Panel LCD
• All-in-one system includes unique
13.3" XGA Super TFT display with
1024 x 768 maximum resolution
• 140° viewing angle • 32MB SRAM
• 512KB L2 cache • 4.3GB hard disk
drive • 20x CD-ROM drive • ATI 3D
Rage LT graphics accelerator • 2MB
SGRAM • 10/100 Base-T LAN port
• 56K X2™ fax/modem
\$2599.99 (HIT 1120-001)



Maxtor DiamondMax
6.4MB Internal Hard Drive Kit
• Up to 9.7ms average seek time
• Connects to PC IDE interface
\$249.99 after \$30
mail-in
rebate
(MXR K01864000)

DiamondMax 8.4GB Int. Hard Drive
(MXR K01884000) **\$329.99**
after \$30 mail-in rebate

DiamondMax 11.5GB Int. Hard Drive
(MXR K01911500) **\$449.99**
after \$30 mail-in rebate
(rebates above expire 6/30/98)

Order Your Free Catalogue Now!



To Order Toll Free and Receive a Free Catalogue

800-221-8180

24 Hours, 7 Days, Anywhere In The USA
PARK ROW • NEW YORK • NY • 10038
FAX: 1-800-232-4432
Choose 295 at www.pcmag.com/infolink

All Major Credit Cards Accepted

Overnight Delivery Available!

Ask Our Advisors

HARDWARE

Too Much of a Good Thing?

I have heard that Windows 95 cannot address more than 64MB of installed memory, but I cannot find the details about the limitation. This is a big concern for me, as I am getting ready to upgrade three systems with 48MB of RAM to 100MB of RAM (plus a processor upgrade). These systems are used for graphics-intensive applications, and the upgrades represent a sizable investment. Can you document this 64MB limitation?

SUZANNE KEEFE
via the Internet

PC MAGAZINE: With memory prices below \$4 per megabyte, it's no wonder that people are loading up their systems. More memory can produce faster performance, especially for graphics applications that process large amounts of data. It is true that Himem.sys has a limit of 64MB on certain platforms, and it's also true that Himem.sys is required to load Windows 95. But Windows 95 itself is not limited to 64MB, paradoxical though that may sound.

Himem.sys is a driver that manages your system's memory. It must be loaded so that Windows 95 can make use of memory above the first megabyte. Himem.sys relies on an interrupt service to report the amount of memory available in the system, and that service is limited to 64MB on ISA-based systems. (EISA systems use a different method to report installed memory, and Himem.sys can handle up to 4GB of memory on those systems.) As a result, Himem.sys cannot identify or use any installed memory above this limit.

It turns out, however, that Himem.sys does not impose its limitations on Windows. On start-up Windows 95 loads its own virtual-mode drivers, which handle a range of functions, including hard disk access and memory management. The Windows 95 virtual-mode driver does not have the 64MB limitation. After loading, the virtual-mode driver replaces Himem.sys, and your system is able to make full use of the installed memory.

Just because your system *can* use the memory above 64MB does not mean that it *will* do so efficiently, however. Another important factor to consider is whether or not your motherboard's chip set and BIOS are designed to work with the additional memory. Some systems are not able to cache more than 64MB

of memory, so you can actually get a loss of performance by adding more memory in some cases. You also may find that you need to increase your secondary system cache (also called L2 cache); in general, you'll need 512KB of L2 cache for 64MB of installed memory. Most motherboards use a SIMM for L2 cache, so upgrading it is usually as simple as taking out one module and inserting another.

Under the circumstances, the most efficient approach may be an empirical one. Purchase enough memory to bring one of the three systems to 96MB, then test its performance at 48MB, 64MB, 80MB, and 96MB. If you find the gains are substantial with the full amount, then upgrade the other two. If you find that the gains are negligible or even diminished above 64MB, then use the new memory to bring the other two to 64MB.—*Alfred Poor*

OPERATING ENVIRONMENTS

FixPak 4 for OS/2

I just heard that FixPak 4 is available for OS/2 Warp 4. How do I know if I need it? If I do, where can I get it and how do I install it?

LARRY MILLER
Detroit, Michigan

PC MAGAZINE: To figure out whether you should install FixPak 4 for OS/2 Warp, you'll need to determine what level you are at. Open a command prompt and type `ver /r`. The response should be similar to this:

```
The Operating System/2 Version is 4.00
Revision 9.023
```

The revision number is 9.023 for Warp 4 with no FixPaks, and the number increases with each update you've installed. If your revision number is lower than 9.028, you don't have FixPak 4 (FP4) installed. Of course, if your system is working satisfactorily, there is really no pressing need to install FixPak. Still, a lot of cumulative updates are contained in FP4, and one part of the FixPak is as much a system improvement as a fix for problems: FP4 makes OS/2 "year 2000-ready."

System administrators will definitely want to install FP4, as there are fixes to some problems introduced by FP3. The diagnostic tools (such as TRAPDUMP and SYSDUMP) are much more reliable. CHKDSK has been improved too, no longer requiring repeated `/F:0` runs on HPFS partitions. All file-system problems are repaired in a single pass. On

the other hand, if you're using a system with power management, such as a laptop, FixPak 4 has a known bug that can cause the system to hang when you try to wake it from stand-by mode. If you encounter the problem on your computer, you'll need to disable power management.

If you decide to install FixPak 4, you have two options: You can create floppy disks or use the online method. To create the FP4 disks, go to ftp://service.boulder.ibm.com/ps/products/os2/fixes/v4warp/english-us/xr_m004 and download the 12 disk images. If you have installed other FixPaks, you should already have the Corrective Service Facility (CSF) disks. The same CSF disks will work with each FixPak, so keep them for reuse. If you don't have the CSF, go to <ftp://service.boulder.ibm.com/ps/products/os2/fixes/wkickr> and download Wkickr.zip. When you unzip that file, you will find the images for the two CSF diskettes and Loadskf.exe, the program that creates disks from the images. To create the disks, type:

```
LOADDSKF image_filename A: /F
```

Use Loadskf to create the two CSF disks

OUR ADVISORS

Alfred Poor is a contributing editor and the author of *The Underground Guide to Hardware*.

Brian Proffitt is a contributing editor of *Computing Today* and the author of *OS/2 Warp Survival Kit*.

Sal Ricciardi is a contributing editor and the author of the *Running Fox-Pro* series from Microsoft Press.

Neil J. Rubenking is contributing technical editor and author of *Delphi Programming for Dummies*.

Luisa Simone is a contributing editor and the author of *Microsoft Publisher by Design*.

Craig Stinson is a contributing editor and the coauthor of *Running Microsoft Excel 97*.

M. David Stone is a contributing editor and the coauthor of *Word for Windows Companion, Second Edition*.

CDW

FREE configuration of your new PC purchase

DESKTOPS

COMPAQ

Desktop 2000 desktops

166/MMX 16MB 2.1GB	799.97
166/MMX 16MB 3.2GB	816.36
200/MMX 16MB 2.1GB	867.97
200/MMX 32MB 3.2GB	967.36
233/Pii 32MB 2.1GB	1275.78
233/MMX 32MB 3.2GB 16X	1186.78
233/Pii 32MB 3.2GB 24X	1469.67
266/Pii 32MB 3.2GB 24X	1649.47

Desktop 2000 mini-towers

166/MMX 16MB 3.2GB 16X	1056.46
200/MMX 32MB 3.2GB 16X	1147.87
266/Pii 32MB 3.2GB 24X	1674.48
300/Pii 32MB 3.2GB 24X	1967.78
200/MMX 32MB 2.4GB	

16X Office 97 SBE	1319.78
-------------------	---------

233/MMX 32MB 4.3GB	
--------------------	--

16X Office 97 SBE	1517.97
-------------------	---------

266/Pii 32MB 4.3GB 24X Office 97 SBE	1939.28
--------------------------------------	---------

Desktop 4000 desktops

166/MMX 16MB 2.4GB	936.57
166/MMX 32MB 3.2GB 16X	1067.87
200/MMX 32MB 2.4GB	1138.56
200/MMX 32MB 3.2GB	1148.67
233/Pii 32MB 2.4GB	1386.78
233/MMX 32MB 3.2GB 16X	1346.87
233/Pii 32MB 3.2GB 24X	1568.75
266/Pii 32MB 3.2GB 24X	1755.57



Desktop 2000
COMPAQ Small Business Edition

- ◆ 200MHz Intel Pentium® processor with MMX® technology
- ◆ 512KB Level 2 cache
- ◆ 32MB SDRAM standard
- ◆ 2.4GB Ultra ATA hard drive
- ◆ 16X Max CD-ROM drive
- ◆ Microsoft Office 97

\$1319.78
CDW 110829

*FREE Compaq software with purchase of CDW 110829. Offer ends 10/31/98 on while supplies last.

Desktop 4000 mini-towers

166/MMX 32MB 3.2GB 16X	1227.31
233/Pii 32MB 3.2GB 24X	1590.87
266/Pii 32MB 3.2GB 24X	1769.27

Desktop 4000 Network PCs

166/MMX 32MB 1.6GB	996.78
200/MMX 32MB 1.6GB	996.67
233/MMX 32MB 2.1GB	1118.67

Desktop 4000S desktops

166/MMX 16MB 2.1GB	966.57
200/MMX 16MB 2.1GB	996.48
233/MMX 32MB 2.1GB	1176.78

Desktop 6000 desktops

233/Pii 32MB 2.1GB 24X	1899.87
266/Pii 32MB 2.1GB 24X	2085.27
266/Pii 32MB 3.2GB 24X	2279.77
300/Pii 64MB 4.3GB 24X	2689.87

Desktop 6000 mini-towers

266/Pii 64MB 4.3GB 24X	2486.67
300/Pii 32MB 4.3GB 24X	2729.87

Presario desktops

200/MMX 32MB 2.1GB 20X	746.00
233/MMX 32MB 3.2GB 20X	946.00
233/MMX 48MB 4GB 24X	1096.00
266/Pii 48MB 4GB DVD	1496.00
300/Pii 64MB 8GB DVD	1796.00
333/Pii 64MB 8GB DVD	2296.00

PC 300GL Series desktops

166/MMX 16MB 2.5GB	836.47
166/MMX 32MB 2.5GB	896.77
200/MMX 32MB 2.5GB	977.25
200/MMX 32MB 2.5GB 16X	1087.75
233/Pii 32MB 2.5GB	1037.52
233/Pii 16MB 2.5GB	1067.35
233/Pii 32MB 2.5GB	1127.58
233/Pii 32MB 4.2GB	1187.15
266/Pii 32MB 2.5GB	1187.55
266/Pii 32MB 4.2GB	1237.50
266/Pii 32MB 4.2GB 32X	1397.25

PC 300PL Series desktops

200/MMX 32MB 2.5GB	1147.95
200/MMX 32MB 4.2GB	1187.75
200/MMX 32MB 4.2GB 24X	1287.30
233/MMX 32MB 4.2GB 24X	1247.56
233/MMX 32MB 4.2GB 24X	1347.65

PC 300XL Series desktops

166/MMX 32MB 2.5GB	1067.84
200/MMX 32MB 4.2GB 24X	1298.75
233/MMX 32MB 3.2GB 24X	1697.56
233/Pii 32MB 2.5GB	1899.75
233/Pii 32MB 4.2GB 16X	1889.75
266/Pii 32MB 2.5GB	1949.69
266/Pii 32MB 4.3GB 16X	2519.68
300/Pii 32MB 4.2GB 16X	2478.90

HP Brio Series mini-towers

166/MMX 16MB 2.1GB	859.78
166/MMX 16MB 2.1GB 16X	1074.57
200/MMX 16MB 2.1GB	807.57
233/Pii 32MB 4GB	1249.76
266/Pii 32MB 4GB	1427.78
200/MMX 32MB 2.1GB 16X	1158.45
233/MMX 32MB 3.2GB	1068.84
233/MMX 32MB 3.2GB 24X	1295.73
233/Pii 4GB 24X	1467.88
266/Pii 4GB 24X	1589.87
300/Pii 8GB 32X	1875.97

HP VE 4 Series desktops

200/MMX 16MB 2.1GB	959.98
200/MMX 32MB 2.1GB 24X	1194.67
200/MMX 32MB 3.2GB	1139.68
233/MMX 32MB 2.1GB	1059.67
233/MMX 32MB 2.1GB 24X	1295.78
266/Pii 32MB 3.2GB	1259.44
233/MMX 32MB 3.2GB	1369.87

HP VL 7 Series desktops

233/Pii 32MB 3.2GB Win 95	1277.85
233/Pii 32MB 3.2GB	1326.38
266/Pii 64MB 4.3GB 24X	2099.76
300/Pii 64MB 4.3GB 24X	2369.78
HP VL 7 Series mini-towers	
233/Pii 32MB 4.3GB 24X	1759.57
266/Pii 64MB 6.4GB 24X	2219.85
333/Pii 64MB 6.4GB 24X	2544.88

Acer

200/MMX 16MB 2.1GB 32X	929.87
200/MMX 32MB 4.3GB 32X	1064.48
233/MMX 32MB 4.3GB 32X	1067.36
200/MMX 32MB 2.1GB 10/100	928.48

NOTEBOOKS

TOSHIBA

Libretto mini-notebooks

50CT 5/75 16MB 772MB 6.1" AM	997.56
70CT 120/MMX 16MB 1.5GB 6.1" AM	1067.36

Satellite & Satellite Pro notebooks

440CDX 133/MMX 16MB	
1.34GB 12.1" DS 10X	1357.06
440CDT 133/MMX 16MB	
1.34GB 12.1" AM 10X	1067.36
460CDX 166/MMX 32MB	
2GB 12.1" DS 10X	1737.86
470CDT 200/MMX 32MB	
2.1GB 12.1" AM 10X	2367.45
480CDT 233/MMX 32MB	
3.8GB 12.1" AM 10X	3367.56

Tecra notebooks

520CDT 166/MMX 32MB	
3.8GB 12.1" AM 10X	2637.56
530CDT 166/MMX 32MB	
3.8GB 12.1" AM 10X	3127.26
550CDT 266/MMX 32MB	
3.8GB 12.1" AM	3847.63
740CDT 166/MMX 16MB	
3GB 13.3" AM 10X WIN NT	2997.15
740CDT 166/MMX 16MB	
3GB 13.3" AM 10X	2727.96
750CDT 233/MMX 32MB	
4.7GB 13.3" AM 20X	4794.86

750CDM 133/MMX 32MB

4.77GB 13.3" AM 20X	4787.16
---------------------	---------

750DVD 233/MMX 64MB

4.77GB 13.3" AM DVD	4987.69
---------------------	---------

Portage notebooks

320CT 266/MMX 32MB 3.8GB 10.4" AM	3567.56
-----------------------------------	---------

Satellite Pro 460CDX

TOSHIBA

◆ 166MHz Intel Pentium® processor with MMX technology

◆ 32MB EDO RAM standard

◆ 2.02GB hard drive

◆ 10X CD-ROM drive

◆ 12.1" dual-scan display



\$1737.86
CDW 109495

Acer

Extensa notebooks

391C 133/MMX 16MB 1.6GB 12.1" DS 20X	1167.63
392C 150/MMX 16MB 2.1GB 12.1" DS 20X	1347.29
391T 166/MMX 16MB 2.1GB 12.1" AM 20X	1837.86
392T 166/MMX 32MB 3GB 12.1" AM 20X	2127.86

TravelMate notebooks

7120T 200/MMX 32MB 3GB 12.1" AM 20X	2957.40
7130TE 233/MMX 32MB 3GB	
13.3" AM 20X	3397.88
TM7164TE 266/MMX 32MB	
4.1GB 13.3" AM	3857.42

COMPAQ

Armada notebooks

1530DM 133/MMX 16MB	
1.4GB 12.1" DS 10X	1299.00
1540DM 150/MMX 16MB	
2.1GB 12.1" DS 20X	1787.40
1550DMT 5/133 16MB	
1.4GB 12.1" AM 10X	1687.78
1571DM 200/MMX 32MB 3.2GB	
12.1" DS 20X	2437.22
1580DMT 150/MMX 16MB	
2.1GB 12.1" AM 10X	2437.46
1598DMT 266/MMX 32MB 4GB	
13.3" AM 20X	3617.46
4131T 5/133 16MB 1.4GB 12.1" AM	997.86
4210T 233/MMX 32MB 3GB 12.1" AM	3477.36
4220T 266/MMX 32MB 4GB 12.1" AM	3967.68
7330T 150/MMX 16MB 2.1GB 12.1" AM	1467.36

AM = active-matrix color display

COMPAQ

7360DMT 200/MMX 32MB 3GB 12.1" AM	3427.23
7380DMT 266/MMX 32MB 4GB 12.1" AM	4997.56
7710MT 150/MMX 16MB 1.6GB 12.1" AM	1897.79
7770DMT 233/MMX 32MB	
3GB 12.1" AM 20X	3689.89
7792DMT 266/MMX 32MB	
5GB 13.3" AM 20X	5457.89

Presario notebooks

1220 200/MMX Media GX	
32MB 2.1GB 12.1" AM 20X	1796.00
1622 233/MMX 32MB 3.2GB 12.1" DS 20X	2496.00
1681 233/MMX 48MB 2.1GB 12.1" AM 20X	2996.00
1710SB 166/MMX 32MB	
2.1GB 12.1" DS 20X	1696.00

HP OmniBook 800 Series notebooks

800CT 166/MMX 16MB 2GB 10.4" AM	3679.60
HP OmniBook 3000 Series notebooks	
200/MMX 16MB 2.1GB 13.3" AM	2987.45
233/MMX 16MB 4GB 13.3" AM	3457.36

HP OmniBook 5700 Series notebooks

166/MMX 16MB 1.6GB 12.1" AM	2327.36
166/MMX 32MB 2.79GB 12.1" AM	2937.48

ThinkPad notebooks

350ED 166/MMX 16MB	
2.1GB 12.1" DS 20X	1787.06
380ED 166/MMX 16MB 3GB 12.1" AM 20X	2647.87
380XD 233/MMX 32MB 3.2GB	
12.1" DS 24X	2387.36
380XD 233/MMX 32MB 4GB 12.1" AM 24X	3147.26
380XD 266/MMX 32MB 5.1GB	
12.1" AM 24X	3817.46

500E 166/MMX 16MB 2.1GB 12.1" AM

560X 200/MMX 32MB 2.1GB 12.1" AM	2387.85
----------------------------------	---------

560X 233/MMX 32MB 4GB 12.1" AM

770 200/MMX 32MB 3.2GB 13.3" AM	3597.67
---------------------------------	---------

770 233/MMX 32MB 4GB 13.3" AM

770 233/MMX 32MB 5.1GB 14.1" AM	4937.87
---------------------------------	---------

FUJITSU

LifeBook 500 Series notebooks

565Tx 166/MMX 32MB 2GB 12.1" AM 20X	2499.00
-------------------------------------	---------

565Tx 233/MMX 32MB 4GB 12.1" AM 20X

LifeBook 800 Series notebooks	3299.00
-------------------------------	---------

656Tx 150/MMX 16MB 2GB 12.1" AM 16X

LifeBook 700 Series notebooks	2799.00
-------------------------------	---------

LifeBook 700 Series notebooks

785Dx 166/MMX 16MB 2GB 12.1" DS 20X	1499.00
-------------------------------------	---------

HITACHI

VisionBook Plus Series notebooks

4360x 166/MMX 16MB 2.1GB	
12.1" AM 10X	1797.36

VisionBook Pro Series notebooks

7560 166/MMX 32MB 3GB 13.3" AM 10X	2499.00
------------------------------------	---------

7580 233/MMX 32MB 3.2GB 13.3" AM 20X

3599.00	
---------	--

AMS Tech

Travel Pro 1000 Series notebooks

1965CT 200/MMX 16MB	
2.1GB 12.1" AM 10X	2297.45

1970CT 233/MMX 48MB

3.1GB 12.1" AM 20X	2617.23
--------------------	---------

Travel Pro 2000 Series notebooks

CDW®

BUY IT TODAY AND USE IT TOMORROW

97% of all credit-approved orders ship same day!

PERIPHERALS

NETWORKING PRODUCTS

3Com	
3C5098-TPO EtherLink III 10BT ISA	58.58
3C5098-TPO EtherLink III coax ISA	89.35
3C5098-COMBO EtherLink III	
combo ISA	119.18
3C589-TP EtherLink III LAN	
PC Card 10BT	129.49
3C582D-TP EtherLink III 33.6	
PC Card 10BT	259.16
3C905-TX Fast EtherLink XL 10/100 PCI	88.46
3C900-TPO EtherLink XL 10BT PCI	109.16
3C900-COMBO EtherLink XL PCI combo	129.25
Couner 56K modem x2 internal	209.02
Couner 56K modem x2 external	245.73
Impact IQ ISDN modem external	199.95
OfficeConnect 4-port hub	59.47
OfficeConnect 8-port hub	78.49
OfficeConnect ISDN LAN modem	366.86
SuperStack II Hub 12-port 10BT	498.76
SuperStack II Hub 24-port 10BT	859.04

COMPAQ

Prosignia 200 servers	
233/Pii 32MB no hdd 16X	
EIDE 10/100 Enet	1469.00
233/Pii 32MB no hdd 16X	
SCSI 10/100 Enet	1695.00
233/Pii 32MB 4 3GB 16X	
SCSI 10/100 Enet	2090.00
233/Pii 64MB 4 3GB 16X 10/100 Enet	4669.00
ProLiant 800 and 850R servers	
6/200 32MB no hdd 8X 10BT Enet	2159.00
6/200 32MB 4 3GB 8X 10BT Enet	2825.00
6/200 32MB 4 2GB 8X 10/100 Enet	3066.00
6/200 32MB no hdd 8X 10/100	
Enet hot plug rack model	3295.00
ProLiant 1200 servers	
233/Pii 32MB no hdd 10/100 Enet	2859.00



HP NetServer E 45 servers	
233/Pii 32MB no hdd 24X 10/100 Enet	1588.58
233/Pii 32MB 4.2GB 24X 10/100 Enet	1998.57
266/Pii 32MB no hdd 24X 10/100 Enet	1898.37
266/Pii 32MB 4.2GB 24X 10/100 Enet	2175.87
266/Pii 64MB 4.2GB 24X 10/100 Enet	2345.58



PC Server 325 servers	
233/Pii 32MB no hdd 8X	2309.58
233/Pii 32MB 4 5GB 8X	3165.67
266/Pii 64MB no hdd 8X	2699.58
266/Pii 64MB no hdd 8X rack model	3179.87
PC Server 350 servers	
6/200 64MB no hdd 8X	3718.27
233/Pii 64MB no hdd 8X	3345.47
266/Pii 64MB no hdd 8X	3528.57

LINKSYS

Combo Ether16 LAN card	35.38
Combo Ether16 LAN card	49.17
Combo PC/Ethernet card 10BT	69.07
10BT 5-port workgroup hub	42.74

NETWORKING PRODUCTS

Linksys	
EtherFast 10/100 LAN PC Card	115.41
EtherFast 2-port 10/100 switch	239.16
StackPro 16-port 100BTX	
rackmount hub	499.88

NETGEAR

10/100 Fast Ethernet PCI adapter	35.97
EN104TP 4-port 10BT slimline Ethernet hub	42.28
EN108TP 8-port 10BT slimline Ethernet hub	58.58

Seagate Software

Backup Exec for Windows NT	
V7.0 single-server edition version upg.	249.76
Backup Exec for Windows NT	
V7.0 enterprise edition version upg.	364.28
Backup Exec for Windows NT	
V7.0 single-server edition	428.17
Backup Exec for Windows NT	
V7.0 enterprise edition	789.88
Backup Exec for NetWare V7.5	
25-user single-server edition	307.58

SMC

EtherEZ 10BT ISA	37.51
EtherEZ ST 10BT hub	38.46
EtherEZ 16TC 10BT hub	148.51
EtherPower II 10/100 PCI	46.13

DATA STORAGE

iomaga

Zip drive 100MB parallel	139.95
Zip drive 100MB external SCSI	139.95
Jaz drive 1GB internal SCSI-2	279.95
Jaz drive 1GB external SCSI-2	299.95
Ditto drive 2GB internal	119.95
Ditto drive 2GB external	169.95
Ditto Dash Card	59.95
Ditto 3.7GB tape cartridge	21.74
Ditto Max up to 7GB internal	199.95
Ditto Max up to 7GB external	199.95
Ditto Max Professional up to 10GB internal	299.95
Ditto Max Professional up to 10GB external	299.95



EZFlyer 230MB external	149.99
SyJet 1.5GB SCSI internal	299.99
SyJet 1.5GB SCSI external PC/Mac	299.99

Quantum

Fireball ST 2.1GB Ultra ATA	155.31
Fireball ST 3.2GB IDE	189.36
Fireball SE 4 3GB Ultra ATA	219.80
Fireball SE 6.4GB Ultra SCSI-3	375.70



2.1GB IDE	135.91
2.55GB IDE	157.99
4 5GB Ultra SCSI	589.84
9.1GB Ultra SCSI	796.09

56K Faxmodem

3Com U.S. Robotics

ITU standard and x2 technology compatible



Compatible with both the determined 56K standard and x2 technology. Includes a CD-ROM jam-packed with great software for work and play.

Internal	\$157.99 CDW 107570
External	\$177.99 CDW 107571

INPUT DEVICES

Kensington Mouse-in-a-Box	19.99
Kensington Expert Mouse V5.0 PS/2	95.71
Kensington Orbit	54.41
Microsoft IntelliMouse V3.0	56.94

DIGITAL IMAGING

Agfa ePhoto 780 digital camera	489.25
Agfa ePhoto 1280 digital camera	828.33
Epson PhotoPC 550 digital camera	299.00
Epson PhotoPC 600 XGA digital camera	499.00
Hewlett-Packard PhotoSmart C20 digital camera	699.00
Kodak DC120 Zoom digital camera	699.00
Kodak DC210 Zoom digital camera	799.00
Minolta Image PIC digital camera	268.58
Minolta Image V digital camera	399.28
Nikon Coolpix 100 notebook camera	99.11
Nikon Coolpix 300 digital camera	409.44
Olympus D-500L digital camera	844.80
Olympus D-600L digital camera	1216.80
Ricoh RDC-300 digital camera	399.00

SCANNERS

Epson Expression 536 Exec	799.00
Epson Expression 836XL	2499.00
Hewlett-Packard PhotoSmart photo scanner	399.00
Hewlett-Packard ScanJet 5e scanner	199.28
Hewlett-Packard ScanJet 5100cse scanner	299.00
Hewlett-Packard ScanJet 6100cse scanner	799.00
Logitech PaperScan Color Parallel	98.20
Microtek Color PageWiz	154.83
Microtek ScanMaker E3 Plus	147.93
Microtek ScanMaker E6 standard	277.92
Minolta Image Scan Dual	686.88
UMAX Astra 610S	129.00
UMAX Astra 1200S w/Photoshop LE	299.00
UMAX Mirage Iise w/MagicScan	2995.00
Visioneer PaperPort mx	139.55
Visioneer PaperPort 3100 flatbed	149.33
Visioneer PaperPort 6000B flatbed	185.29
Visioneer PaperPort Strobe	249.99

PRINTERS

Canon

BJC80 portable	299.00
BJC7000	349.00

EPSON

Stylus Color 400	179.00
Stylus Color 800	249.00
Stylus Color 800	349.00
Stylus Color 1520	799.00
Stylus Color 3000	1999.00
Stylus Photo	299.00



HP DeskJet 340 portable inkjet printer	245.85
HP DeskJet 672C color printer	199.00
HP DeskJet 694C color printer	239.00
HP DeskJet 722C color printer	299.00
HP DeskJet 890Cse printer	399.00
HP DeskJet 1000Cse color printer	387.07
HP LaserJet 5Si printer	2438.03
HP LaserJet 6Lse printer	399.00
HP LaserJet 6MP printer	877.26
HP LaserJet 6Pse printer	799.00
HP LaserJet 4000se printer	1149.00
HP PhotoSmart photo printer	399.00

LEXMARK

Color Jetprinter 1000	139.02
Color Jetprinter 7000	347.80
Optra E+	394.27
Optra S 1250	999.94
Optra S 1650	1069.28
Optra S 2450	1979.48
Optra SC 1275	3289.89

OKIDATA

OkJet 2020	199.00
Okpage 4w	199.00
Okpage 6e	299.00
Okpage 16n	899.00

MONITORS

MAG InnoVision 410V2 14" 0.28mm	159.68
MAG InnoVision DJ530 15" 0.28mm	267.18
MAG InnoVision DJ700 17" 0.28mm	499.29

PaperPort 6000B

visioneer



\$136.29* CDW 108762	\$50 REBATE
-------------------------	----------------

*After \$50 max. manufacturer rebate / valid through 9/30/98

MONITORS

MAG InnoVision DJ800 19" 0.28mm	679.14
NEC MultiSync E500 15" 0.25mm	309.11
NEC MultiSync E700 17" 0.25mm	569.65
NEC MultiSync E1100 21" 0.28mm	1089.80
Philips Magnavox 105S 15" 0.28mm	187.78
Philips Magnavox 107S 17" 0.28mm	349.55
Princeton E050 15" 0.28mm	238.84
Princeton E070 17" 0.28mm	389.14
Princeton E090 19" 0.28mm	609.83
Sony Multiscan 200es 17"	
PnP 0.25mm	549.17
Sony Multiscan 300sf 20"	
PnP 0.30mm	129.56
ViewSonic E771 17" 0.27mm	389.54
ViewSonic G773 17" 0.26mm	469.00
ViewSonic G5771 17" 0.27mm	469.00
ViewSonic G790 19" 0.26mm	865.83
ViewSonic G810 21" 0.25mm	1089.70

PC CARDS

3Com Ethernet adapter w/XJACK	107.80
3Com 32-bit Fast EtherLink XL CardBus	147.57
3Com LAN PC Card combo	169.88
3Com 33.6K w/XJACK	169.99
3Com 33.6K cellular w/XJACK	228.98
3Com 33.6K cellular	228.98
3Com 33.6K 10BT LAN-modem	259.16
3Com 33.6K 10BT LAN-modem combo	299.83
3Com 56K w/XJACK	214.66
3Com 56K cellular w/XJACK	214.66
Hayes ACCURA 56K	179.52
Hayes OPTIMA 56K	199.24
Hayes OPTIMA 56K w/EJACK	199.24
Intel EtherExpress PRO/100 16-bit PC Card Enet/56K	309.44
Practical Peripherals 56K flex cellular	166.41
Simple 33.6K Communicator w/SimpleJack	139.89
Simple 33.6K cellular	149.53
Simple 56K Communicator	154.50
Xircor 56K	165.84
Xircor 10/100+modem 56K	327.28
Xircor 10/100+modem 56K w/MiniDock	299.85

MODEMS

56K x2 internal	209.02
56K x2 external	245.73
I-modem ISDN V.34 fax/modem external	269.92

U.S. Robotics

Winmodem V.34 33.6K internal w/fax	57.87
V.34 33.6K internal w/fax	84.32
V.34 33.6K external w/fax	99.07
Voice V.34 33.6K internal w/fax	109.44
Voice V.34 33.6K external w/fax	137.30
56K x2 internal	139.93
56K x2 external	158.92
56K x2 Voice external	165.82
56K x2 Voice external	169.88
56K Winmodem	93.69
ISDN 128K terminal adapter	176.25

Hayes

ACCURA 56K internal	135.06
ACCURA 56K external	159.01
ACCURA 56K speakerphone internal	168.35
ACCURA 56K speakerphone external	179.78
OPTIMA 56K external	289.30
ACCURA ISDN	229.04

UPS SYSTEMS



Back-UPS Office	104.78
Back-UPS Pro 280 PNP	134.14
Back-UPS Pro 420 PNP	219.93
Back-UPS Pro 650 PNP	265.91
SurgeArrest Personal	19.51
SurgeArrest Professional	27.91
SurgeArrest Network	31.59



BC Internet 325 2 outlets RJ11	79.89
BC PRO 450 4 outlets LAN port	139.27
BC PRO 550 4 outlets LAN port	169.80

800-998-4239

Office 97 Small Business Edition

Microsoft Includes:

- Microsoft Word 97
- Microsoft Outlook 98
- Microsoft Publisher 98
- Microsoft Excel 97
- Microsoft Small Business Financial Manager 98
- Microsoft Internet Explorer V4.0
- Microsoft Expedia Streets 98

Full version **\$455.63** CDW 103330
Upgrade **\$224.08** CDW 109948

56K Communicator Pro

Simple with SimpleJack

- Supports K56flex technology
- Connects at highest speed: 56K, 33.6K, or 28.8K bps
- SimpleJack in-line RJ-11 telephone connector
- 14.4K bps fax
- Cellular-ready for Motorola phones
- Voice mail/automated paging

\$159.63 CDW 100161

Norton Prevention Power Pack

SYMANTEC

Includes:

- Norton AntiVirus
- Norton CrashGuard Deluxe
- Norton Uninstall Deluxe

\$67.00 CDW 109489

Smart Video Recorder III

intel

\$169.54 CDW 77202

- Captures and compresses high quality quarter-screen motion video at up to 30 frames per second
- High-quality software compression and playback eliminates the need for expensive video hardware on the capture board

SOFTWARE

Adaptec

Easy CD Creator Deluxe Edition **70.06**

Acrobat V3.0.1 WIN/NT CD **179.16**
Illustrator V7.0 upg WIN/NT CD **115.55**
Illustrator V7.0 WIN/NT CD **369.00**
PageMaker V6.5 upg WIN/NT CD **99.74**
PageMaker V6.5 WIN/NT CD **548.48**
PageMill V2.0 WIN/NT 3.5/CD **93.20**
Photoshop V4.0 upg WIN/NT CD **169.35**
Photoshop V4.0.1 WIN/NT CD **548.48**
Premiere V4.2 WIN/NT CD **487.20**
Type Manager Deluxe V4.0 WIN/NT CD **62.29**

Clariscor

Clariscor Office WIN/NT **67.86**
Clariscor V5.0 upg WIN/NT **43.81**

Borland

C++ Builder 3 Professional upg WIN/NT **258.35**
C++ Builder 3 Professional WIN/NT **519.70**
Delphi 3 Professional WIN/NT CD **529.15**
Delphi Pro 3 comp upg WIN/NT **254.83**
JBuilder Professional upg WIN/NT CD **259.14**
JBuilder Professional WIN/NT CD **619.24**
JBuilder Standard WIN/NT CD **89.21**

Brother

Organizer Plus V3.01 WIN/NT **116.45**
PrintShop Premier WIN/NT **36.96**

Corel

DRAW 8 upg WIN/NT CD **224.51**
DRAW 8 WIN/NT CD **425.93**
WordPerfect Suite 8 Pro upg WIN/NT CD **139.30**
WordPerfect Suite 8 Pro WIN/NT CD **335.14**
WordPerfect Suite 8 upg WIN/NT CD **79.67**
WordPerfect Suite 8 WIN/NT CD **278.39**

CD-ROM

AAA Map 'n Go DVD Deluxe WIN/NT DVD **72.47**
Map 'n Go V3.0 WIN/NT CD **24.75**
Street Atlas USA V5.0 WIN/NT CD **37.92**
Triptimate/Street Atlas USA V5.0 WIN/NT **139.65**

Extensis

Intelligence V3.0 universal CD **93.99**
MaskPro V1.0 universal CD **279.99**
PageTools V2.0 WIN/NT **93.99**
PhotoFrame V1.0 universal CD **123.99**
PhotoTools V2.0 WIN/NT **123.99**
Portfolio V3.0 universal CD **93.99**

FileMaker

FileMaker Pro V4.0 upg WIN/NT CD **87.77**
HomePage V3.0 WIN **88.38**

GOLDMINE

GoldMine V4.0 WIN/NT **180.26**

CDW DIRECTORY

PC sales 800-998-4239
Mac sales 800-509-4239
Corporate sales 800-280-4239
Corporate software sales 800-294-4239
Government and Education sales 800-615-4239
Networking sales 800-661-4239

BUY WITH CONFIDENCE
CDW® IS A NABIDAZ TRADER COMPANY
TICKET SYMBOL: CDW® D & B used SAT Date 10-19-98

Print card charges are not submitted until time of shipment. For your protection, we ship only to your credit card's verified billing address. Freight is calculated as the carrier's actual freight charge plus insurance and packaging material. The cost of insurance is 0.35% (0.0035) of the order total. Packaging materials will not exceed \$4.00 for single package shipments or \$8.00 for multi-package shipments. Before returning any product, you must obtain an RMA number. Non-defective returns and requests for a refunding item. Software, ships and other electronic components are not returnable. Allow 10 business days for shipping when paying by personal check. All pricing subject to change. For all prices, products and offers, CDW reserves the right to make adjustments due to changing market conditions, product discontinuation, manufacturer price changes, errors in advertisements or other extenuating circumstances. All trademarks and registered trademarks are the sole property of their respective owners.

Intuit

Expensable V2.0 WIN **43.97**
Quickbooks Pro V5.0 WIN **186.82**
Quickbooks V5.0 WIN **94.05**
Quicken Deluxe 98 WIN CD **58.86**

Lotus

Voice Pad Pro V1.0 WIN CD **48.42**
Voice Pro V2.5.2 WIN/NT CD **176.57**

Macromedia

Director 6 Multimedia Studio upg WIN/NT CD **479.86**
Director 6 Multimedia Studio WIN/NT CD **924.25**
Director 6 upg WIN/NT CD **379.12**
Flash 2 WIN/NT CD **259.37**
FreeHand 8 upg WIN **138.80**
FreeHand 8 WIN **379.87**

Math Soft

Mathcad 7 Professional WIN/NT CD **349.80**
Mathcad 7 Standard WIN/NT CD **99.99**
Mathcad 7 Technical/Professional Suite WIN/NT CD **989.96**

MetaCreations

Art Dabbler univ WIN **42.06**
Bryce 3D univ CD **167.83**
Painter V5.0 upg WIN **89.23**
Painter V5.0 WIN/NT **259.14**
Ray Dream 3D WIN **87.95**
Ray Dream Studio 5 upg WIN/NT CD **88.95**
Ray Dream Studio 5 WIN/NT CD **256.90**
Kai's Photo Shop WIN/NT CD **41.60**
Kai's Power GOO WIN/NT **39.78**
Kai's Power Tools V3.0 WIN/NT **109.15**

Microsoft

Access 97 upg WIN/NT CD **93.83**
Access 97 WIN/NT CD **294.53**
Bookshelf 98 WIN/NT CD **43.83**
Encarta 98 Encyclopedia WIN/NT CD **43.28**
Encarta 98 Virtual Globe WIN/NT CD **43.28**
Encarta Encyclopedia 98 Deluxe CD **66.87**
Encarta Reference Suite 98 WIN/NT CD **93.07**
Excel 97 upg WIN/NT CD **93.81**
Excel 97 WIN/NT CD **298.53**
Expedia Streets 98 Deluxe WIN/NT CD **61.10**

CDW TELEPHONE HOUSE

Sales
Monday-Friday 7 a.m.-9 p.m. CT
Saturday 9 a.m.-5 p.m. CT
Tech Support>Returns for Customers
800-383-4239
Monday-Friday 7 a.m.-9 p.m. CT
Saturday 9 a.m.-5 p.m. CT

Astra 1220P

UMAX Computer Corporation

\$199.00 CDW 109332

- Affordable, single pass, 36-bit color scanning
- Parallel port interface
- Scan up to letter size (8.5" x 11.7") documents
- 600 x 1200 hardware resolution; 9600 x 9600 maximum software-enhanced resolution

Microsoft

Expedia Streets 98 Plus **43.63**
Flight Simulator 98 WIN/NT CD **49.38**
FrontPage 98 vers upg WIN/NT CD **48.78**
FrontPage 98 WIN/NT CD **134.79**
Greetings Workshop V2.0 WIN/NT CD **26.59**
Money 98 Financial Suite WIN/NT CD **43.28**
Money 98 WIN/NT CD **34.45**
Office 97 Developer Edition WIN/NT CD **708.17**
Office 97 Pro upg w/Bkahl & Intellimouse WIN/NT CD **319.04**
Office 97 Pro w/Bkahl upg WIN/NT CD **309.60**
Office 97 Pro w/Bkahl WIN/NT CD **539.67**
Office 97 Sm Business Edition V2.0 upg WIN/NT CD **224.08**
Office 97 Sm Business Edition V2.0 WIN/NT CD **445.63**
Office 97 Std upg WIN/NT CD **225.16**
Office 97 Std WIN/NT CD **449.10**
Outlook 97 WIN/NT CD **93.81**
Picture It! V2.0 WIN/NT CD **43.28**
Plus! WIN/NT CD **43.80**
PowerPoint 97 upg WIN/NT CD **94.80**
PowerPoint 97 WIN/NT CD **298.53**
Project 98 upg WIN/NT CD **178.82**
Project 98 WIN/NT CD **445.70**
Publisher 98 CD WIN/NT **89.58**
Visual Basic Pro V5.0 comp upg WIN/NT CD **219.38**
Visual Basic Pro V5.0 WIN/NT **445.67**
Visual C++ Pro V5.0 upg WIN/NT **219.38**
Visual C++ Pro V5.0 WIN/NT **445.67**
Visual Studio 97 Enterprise Edition WIN/NT CD **1339.24**
Visual Studio 97 Pro upg WIN/NT CD **444.57**
Visual Studio 97 Pro WIN/NT CD **889.08**
Windows 95 upg w/Internet Explorer V4.0 CD **97.45**
Windows 95 w/Internet Explorer **184.38**
Windows 95 w/Internet Explorer upg **97.44**
Windows NT Workstation V4.0 CD **267.79**
Windows NT Workstation V4.0 upg CD **229.76**
Windows NT Workstation V4.0 vers upg CD **129.52**
Word 97 upg WIN/NT CD **75.07**
Word 97 WIN/NT CD **298.53**
Works V5.4 WIN/NT CD **43.80**

network

Hurricane 98 WIN **36.79**
Nuts & Bolts WIN CD **34.18**
VirusScan Deluxe V3.0 WIN/NT/DOS **64.80**
VirusScan Security Suite WIN/NT **73.77**
VirusScan V3.0 WIN/NT/DOS/OS2 **46.23**
WebScanX WIN/NT CD **31.00**

PRO

Drive Image WIN/NT/DOS V5.0+ **67.54**
DriveCopy WIN/NT/DOS **36.91**
PartitionMagic V3.0 WIN/NT/DOS/OS2 CD **67.88**

See CDW's ad in the front of this issue!

Megahertz XJ1560

56K bps PC Card modem

- Built-in XJACK connector saves you cable-carrying hassles
- Smart Battery Saver allows notebooks to work longer between battery charges
- Digital Line Guard protects modem from high-voltage digital/VBX lines
- Intelligent Auto Install guides you through auto installation in a matter of minutes

56K modems are capable of 56K bps downloads, however current regulations limit download speed to 53K bps

\$214.66 CDW 87598

ProCD

Select Phone 97 Deluxe WIN/NT CD **119.50**
Select Phone 97 WIN/NT CD **83.93**

QuarkXPress

QuarkXPress V4.0 WIN/NT **749.89**

CD Architect WIN/NT **199.95**
Sound Forge V4.0 WIN/NT **256.90**
Sound Forge XP V4.0 WIN/NT **77.82**

SYMANTEC

ACT! V4.0 upg WIN/NT **83.82**
ACT! V4.0 WIN/NT **169.52**
CrashGuard Deluxe V3.0 WIN/NT **44.61**
Norton AntiVirus Deluxe V4.0 WIN/NT/DOS CD **63.77**
Norton AntiVirus V4.0 WIN/NT/DOS CD **44.60**
Norton Uninstall Deluxe WIN/NT CD **35.79**
Norton Utilities V3.0 WIN/NT **66.85**
pcANYWHERE32 V8.0 H/R upg **72.45**
pcANYWHERE32 V8.0 host WIN/NT CD **74.91**
pcANYWHERE32 V8.0 host/remote WIN/NT CD **129.40**
pcANYWHERE32 V8.0 remote WIN/NT CD **86.55**
Visual Cafe Database Dev Edition V2.5 WIN/NT **726.71**
Visual Cafe for Java V2.0 Web Dev Edition WIN/NT **86.05**
Visual Cafe for Java V2.5 Pro Dev Edition WIN/NT **258.35**
WinFax PRO V8.0 WIN/NT **93.37**

VISIO

Map WIN/NT CD **189.39**
Network Equipment **425.01**
Professional V5.0 upg WIN/NT CD **129.48**
Professional V5.0 WIN/NT CD **295.10**
Standard V5.0 upg WIN/NT CD **86.80**
Standard V5.0 WIN/NT CD **129.35**
Technical V5.0 upg WIN/NT CD **129.40**
Technical V5.0 WIN/NT CD **298.00**

XEROX

Pages PRO 97 WIN/NT CD **91.04**
TextBridge Pro 98 WIN/NT CD **72.34**



COMPUTER DISCOUNT WAREHOUSE

The right price. The right advice.

800-998-4239

and the 12 FP4 disks. Then boot your system from the first CSF disk and follow the prompts to insert the FixPak disks. (IBM has changed terminology since the Corrective Service Facility was created. When the CSF prompts you for CSD disks, insert the FixPak disks.)

You can also do the update automatically over the Internet using Remote Software Update. Point your browser to ps.boulder.ibm.com/pbin-usa-ps/getobj.pl?/pdocs-usa/softupd.html to download the add-on your browser will need to do the update. Once you have installed the two add-on files, click on the FixPak version on that Web page that corresponds to your national language (such as "English-US"), and the update should take place automatically. Be aware, though, that it will take however long your Internet connection needs to download around 15MB.

No serious problems have been reported with FP4 as of this writing, but you should examine your system carefully after installation. During installation, FP4 archives files it is replacing (you need 14MB free disk space), so if you want to uninstall it, you can run Service.exe from the CSF disk. Click on *Change product list* and select *archived products*. You can then back out the FP4 update to return to your original setup.—*Brian Proffitt*

Managing Temporary Internet Files

Internet Explorer puts files in Windows/Temporary Internet Files and seems to leave them forever. I just deleted over 100 megabytes worth; my disk was filling up with just these files. Is there any way to solve this problem without disabling the program or losing all the settings? I had files six months old taking up space!

VAN A. HUTCHINS
via the Internet

PC MAGAZINE: Quite a few other readers have written us with variations on this same question. Yes, you can reduce the space used for temporary Internet files, but don't just delete the folder. Instead, launch the Internet applet in Control Panel, click on the *Advanced* tab, and press the *Settings* button. Here you can choose where the temporary Internet files will be stored and what percent of that drive they can use. When the space used goes above the specified percentage, the oldest temporary files will be deleted.

Press the *Empty Folder* button to discard the cached temporary files. Now tweak the slider on the same dialog to tell Internet Explorer to use a smaller percentage of your

disk for temporary files. Otherwise the folder will fill back up again to the same size in no time.—*Neil J. Rubenking*

WORD PROCESSING

Placing Two or More Graphics On a Line in Word

The obvious way to place more than one graphic on a line in Microsoft Word 6 and 7 is to use frames. Insert a graphic with Insert | Picture, select the graphic by clicking on it, and then choose Insert | Frame. Position the mouse pointer inside the frame so you can see four thin arrows pointing up, down, left, and right. Click and hold the left mouse button and you can drag the picture to any location.

You can also resize images on the same line to match each other. Select any graphic, then move the mouse pointer to one of the small

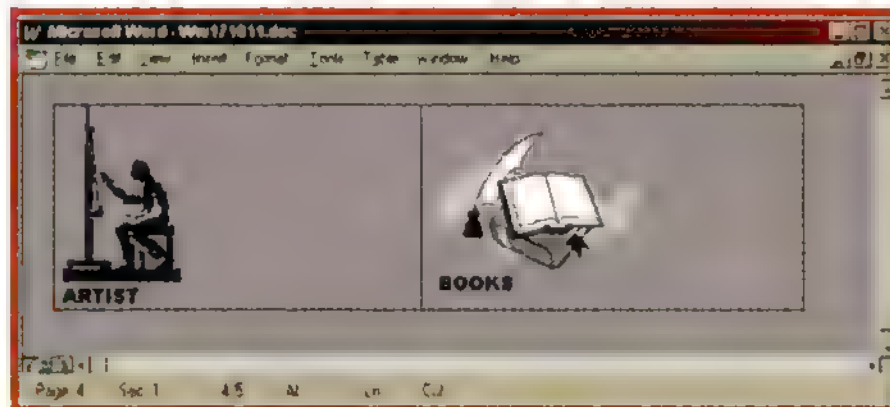


FIGURE 1: The easiest way to line up graphics in Word is to insert them into a table.

square boxes, where it will change to a left-right, up-down, or diagonally pointing pair of arrows. You can then click the left mouse button and drag to change size.

In theory, you should be able to line up two or more graphics this way. In practice it can be tricky. If you want a border around each graphic, for example, it's hard to size the two so the borders are the same height and width. And lining them up can also be a challenge.

You can get the same effect with less work if you use a table. For two graphics, start by inserting a table with two cells. Choose Insert | Table, set columns to 2, set rows to 1, leave the column width at Auto, and choose OK. With the cursor in the first cell, insert a picture with the Insert | Picture command. Then move to the second cell, and insert the second graphic.

You can now resize either graphic and adjust the distance between them or the amount of space available to each by clicking on and dragging the line dividing the cells. You can also add a label in each cell. If you want to add a border, select the entire table, choose Format |

Borders and shading, then choose Borders, and add either a single border around both graphics or a border around the graphics with a line between them. The result should look something like Figure 1.

LINDA JONES
West Lafayette, Indiana

PC MAGAZINE: There are some refinements to this technique worth mention. Before I get to those, however, note that the basic technique also works with Word 97. The key difference is that Word 97 normally sets graphics to float over text, in the program's equivalent of frames. And if a graphic is set to float over text, you can't insert it into a table cell.

With some options for inserting graphics—such as *Insert | Picture | From File*—if you move to a table cell before you insert a graphic, Word 97 will recognize that you are inserting the picture into a table, and it will turn off *Float Over Text*.

With other choices—notably *Insert | Picture | Clipart*—it will still insert the graphic to float over text, with no way for you to override the setting.

To move clip art to a table cell after you've inserted it into a file, right-click on the graphic, choose *Clipart | Convert*, remove the check from the *Float Over Text* check box, and choose OK. Word may move the graphic into the

table at this point, but not necessarily into the cell you have in mind. To place it where you want it, select the graphic by clicking on it, choose *Edit | Cut*, move the cursor to the cell where you want the graphic, and choose *Edit | Paste*. From this point on, you can follow essentially the same steps as with Word 6 or 7.

Regardless of the Word version, you may have trouble getting the text labels to align properly, because the horizontal positions for the labels change with the sizes of the graph-

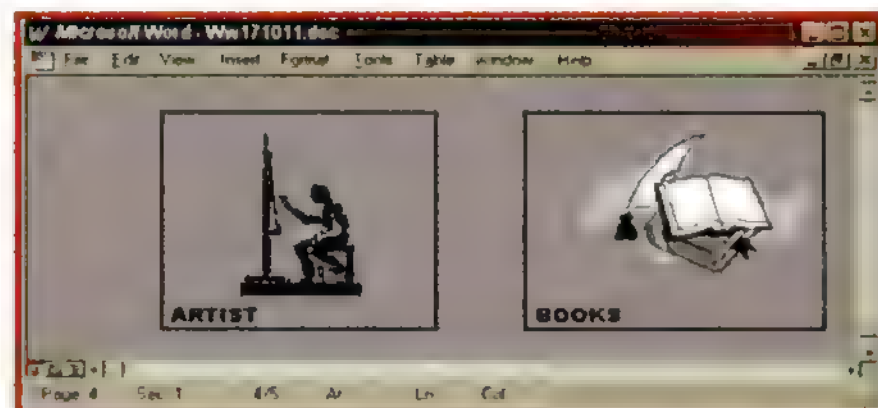


FIGURE 2: To create a separate border for each graphic, add a column between graphics and format the borders appropriately. To indent the graphics, add a blank column to the left of the first graphic.

ics. In Figure 1, for example, the BOOKS label is a bit higher than the ARTIST label, because the book graphic is a bit shorter vertically. The

PCTech Ask Our Advisors

fix is to insert the table with two rows and put the labels in the second row so they'll automatically line up with each other.

You may want a separate border around all four sides of each graphic rather than a shared border between the two graphics. And you may not want the leftmost border to be flush-left with your text. The easy fix here is to use additional cells and adjust the cell-border position for size. In Figure 2, I used a four-column, two-row table. The graphics are in the second and fourth cells of the first row. The labels are in the second row.

To get two separate borders for the graphics, as in the figure, start with a table that isn't showing any borders. If necessary, first select the entire table, choose *Format | Borders and Shading* and then *Borders*, and choose *None*. Then select both cells in one of the columns in which you want a border; choose *Format | Borders and Shading*, then *Borders*, then *Box*, and then *OK*. Repeat the process for the second column. The result will look like two independent graphics, which will automatically line up correctly.—M. David Stone

SPREADSHEETS

Calculating Hours from Times

I was trying to make a spreadsheet in Excel that showed my start time for the day (column B), my end time for the day (column C), and the number of hours worked ($=C1-B1$, in column D). The answer I got was not the number of hours worked but rather a time. I also needed to subtract an hour for lunch. I tried $(C1-B1)-1$, but this formula also gave me a time, not the number of hours worked. How am I supposed to do these calculations?

MIKE DENUCCIO
San Antonio, Texas

PC MAGAZINE: Judging by the amount of mail I get on this subject, I'd have to say that making time calculations simpler ought to be a priority for the next release of Excel. Here again is the scoop:

Excel records times as fractions of 24 hours. Noon is 0.5, 6:00 A.M. is 0.25, 6:00 P.M. is 0.75, and so on. If you subtract 9:00 A.M. from 5:00 P.M., you're actually subtracting 0.375 from 0.7083, which gives you 0.3333. Unfortunately, if your 9:00 A.M. and 5:00 P.M. are formatted as times, which they almost certainly are, Excel thinks you also want the result of your subtraction formatted as a time, so it displays 8:00 AM. You can turn this result back into 0.3333 by applying a numeric format. But 0.3333 is probably not

very meaningful, either. To report the difference as a number of hours, you have to remember that that fraction represents a portion of a 24-hour period. Multiply it by 24 and you've finally got hours. Thus, in cell D1, you need to write $=(C1-B1)*24$. Then you need to assign a numeric format to the result.

Note that the parentheses around $C1-B1$ are essential. Without them, Excel would do the math this way: $C1-(B1*24)$.

Once you've got the time difference expressed as hours instead of day fractions, subtracting a lunch hour (or any other quantity expressed as hours) is simple arithmetic. The formula $=(C1-B1)*24-1$ will get you the difference in hours between end time and start time, minus 1 hour.—Craig Stinson

DATABASES

Using Active and Archive Tables in Microsoft Access

I use Microsoft Access to create a log of Emergency Department visits. To keep the speed up, I archive all visits each quarter to an archive table with the same structure as the active log table. This means all of the visits are recorded without duplication but are spread over the two tables; all visits prior to the archive date are in the archive table, and all visits on or more recent than the archive date are in the active table. This works most of the time, but occasionally I need to run reports that span the time frame of both tables. Is there a way to query both tables as if they were one continuous table?

AL ROGERS, D.O.
Warner, New Hampshire

PC MAGAZINE: Sure. You need to use the UNION operator to create what's called a *union query*. A union query merges two SQL SELECT queries into one result. For instance, suppose you have two tables to record information on patient visits, one called Active Visits and one called Archived Visits. Both tables have the same structure and contain fields for visit ID, patient ID, date of visit, and time of visit. The SQL statement for a union query combining the two would look like this:

```
Select *
From [Active Visits]
UNION
Select *
From [Archived Visits];
```

This tells Access to merge the result of the two SELECT queries so that the final result includes all rows from both queries except for

exact duplicates. If you want the duplicates too, you can use UNION ALL.

To create a union query using Access 97, select the *Queries* tab in the Database window and then choose *New*. When the New Query dialog appears, click on *Design View* and then choose *OK*. When the Show Table dialog appears, choose the *Close* button without selecting any tables. Then select the *Query* menu, select *SQL Specific*, and choose *Union*. At this point you have to type in the SQL statement for the union query. Union queries are visible only in SQL view and not in the Query Design grid.

Remember to enclose table names of more than one word in square brackets and to end the SQL statement with a semicolon. The number of columns in each of the source queries must match too. If your first SELECT results in two columns and the second results in three, Access won't let you run the union query. The column types for the matching columns should really be the same too, although Access doesn't insist on it. If column types don't match, Access will convert the merged column to text in the query result.

Once you have tested and saved the union query, you can use it in additional queries or as the source for printed reports. For example, assuming you have a patients table with information on patient names and addresses, you might create a new query that joins the union query with the patients table in order to get patient names on reports.

A sample database that includes a union query is available on PC Magazine Online. Look for Union.mdb in this issue's archive file.—Sal Ricciardi

HOW TO CONTACT US--

Send your tips and questions to our advisors in any of the following ways:

E-MAIL pctech@zd.com

FAX 212-503-5799

MAIL Solutions, PC Magazine, One Park Ave., New York, NY 10016-5802 (Please send a floppy disk and a printout.)

COMPUSERVE To reach individual editors as listed on ZD Net, type GO PCMSTAFF.



If we print your tip, you'll receive \$50 plus a PC Magazine T-shirt. We regret that we cannot answer letters individually.

We will beat any price on any computer, from any authorized catalog reseller. We want your



TOSHIBA Notebook Computers!

Satellite Pro Series

'300 price drop on the 440CDT!

Now as low as
\$1,359!
#97050

While supplies last!

Order#	Model	Pentium® processor*	RAM	HD	CD	Display	Price
#97050	440CDX	133 MMX*	16	1.44GB	10X	12.1" HCAD	\$1,359
#97051	440CDT	133 MMX*	16	1.44GB	10X	12.1" TFT	\$1,449
#28416	470CDT	200MMX*	32	2.1GB	10X	12.1" TFT	\$2,069
#24680	480CDT	233 MMX*	32	4GB	10X	12.1" TFT	\$3,459

Tecra Series

Order#	Model	Pentium® processor*	RAM	HD	CD	Display	Price
#92330	730XCDT	150 MMX*	16	2.02GB	10X	12.1" TFT	\$1,499
#99055	530CDT	166 MMX*	32	2.1GB	10X	12.1" TFT	\$3,009
#28420	550CDT	266 MMX*	32	4.0GB	20X	12.1" TFT	\$3,679
#26073	750VDO	233 MMX*	64	4.7GB	—	13.3" TFT	\$5,249
#24683	750CDM	233 MMX*	32	4.0GB	—	13.3" TFT	\$4,879

Portégé Series

Order#	Model	Pentium® processor*	RAM	HD	CD	Display	Price
#97053	300CT	133 MMX*	32	1.6GB	—	10.4" TFT	\$1,849
#28419	320CT	266 MMX*	32	3.8GB	—	10.4" TFT	\$3,549

Libretto Series

Order#	Model	Pentium® processor*	RAM	HD	CD	Display	Price
#97048	50CT	75MHz	16	810MB	—	6.1" TFT	\$949
#24678	70CT	120MMX*	16	1.6GB	—	6.1" TFT	\$1,079

*Pentium® processor with MMX™ technology. †While supplies last!



Fujitsu LifeBook 765DX

- 166MHz Pentium processor w/MMX™ technology
- 16MB RAM
- 2GB hard drive
- 20X CD-ROM
- 12.1" SVGA Display

only
\$1,499!
#28616



IBM Notebook Computers!

ThinkPad 380 Series

as low as
\$1,699!
#99913

Order#	Model	Pentium® processor*	RAM	HD	CD	Display	Price
#94276	TP380D	150MHz MMX*	16	2.1GB	8X	12.1" TFT	\$1,849
#99913	TP380ED	166MHz MMX*	16	2.1GB	20X	12.1" DSTN	\$1,899
#28626	TP380X	233MHz MMX*	32	3.2GB	20X	12.1" HPA	\$2,379
#99915	TP380ED	166MHz MMX*	16	3.0GB	20X	12.1" TFT	\$2,459
#28627	TP380XD	233MHz MMX*	32	4.0GB	20X	12.1" TFT	\$3,149
#28625	TP380XD	266MHz MMX*	32	5.1GB	20X	12.1" TFT	\$3,599

ThinkPad 560

Order#	Model	Pentium® processor*	RAM	HD	CD	Display	Price
#28622	TP560X	200MHz MMX*	32	2.1GB	—	12.1" HPA	\$2,379
#96041	TP560	166MHz MMX*	16	2.1GB	—	12.1" TFT	\$2,549
#11247	TP560X	233MHz MMX*	32	4GB	—	12.1" TFT	\$3,429

ThinkPad 770

Order#	Model	Pentium® processor*	RAM	HD	CD	Display	Price
#99904	TP770	200MHz MMX*	32	3.2GB	—	13.3" TFT	\$3,599
#99908	TP770	233MHz MMX*	32	4.0GB	—	13.3" TFT	\$4,199
#99910	TP770	233MHz MMX*	32	5.1GB	—	14.1" TFT	\$4,949

*Pentium® processor with MMX™ technology.



The versatile notebook for business on the go!

as low as
\$1,599!
#28399

Order#	Model	Pentium® processor*	RAM	HD	CD	Display	Price
#28399	P-5260	166MHz MMX*	16	2.1	20X	12.1" HPA 56k	\$1,599
#28400	P-5280	233MHz MMX*	32	3.2	20X	12.1" HPA 56k	\$2,199

VisionBook Pro

Order#	Model	Pentium® processor*	RAM	HD	CD	Display	Price
#27832	Pro 7370	200MMX*	32	3.2	20X	12.1" TFT 56k	\$2,999
#11515	Pro 7580	233MMX*	32	3.2	20X	13.3" TFT 56k	\$3,599
#28382	Pro 7590	266MMX*	48	5.0	20X	13.3" TFT 56k	\$4,199

*Pentium® processor with MMX™ technology.

COMPAQ Notebook Computers!

Armada 1500 Series

Now as low as
\$1,449!
#97389



FREE 16MB Upgrade with Armada 1500 Series
Call for details. Offer ends April 30

Order#	Model	Pentium® processor*	RAM	HD	CD	Display	Price
#97389	1530DM	133MHz MMX*	16	1.4GB	10X	12.1" CSTN	\$1,449
#94064	1550DM	133MHz	16	1.4GB	10X	12.1" TFT	\$1,649
#14708	1540DM	150MHz MMX*	16	2.1GB	20X	12.1" CSTN	\$1,799
#26785	1560DM	166MHz MMX*	16	3.1GB	20X	12.1" CSTN	\$1,899
#14710	1590DMT	166MHz MMX*	16	2.1GB	20X	12.1" TFT	\$2,599
#26786	1592DMT	233MHz MMX*	32	3.1GB	20X	12.1" TFT	\$3,149

Armada 4100/4200 Series

Order#	Model	Pentium® processor*	RAM	HD	CD	Display	Price
#26783	4210T	233MHz MMX*	32	3.0GB	—	12.1" TFT	\$3,359
#26784	4220T	266MHz MMX*	32	4.0GB	—	12.1" TFT	\$3,849

NEW Armada 7300 Series

Order#	Model	Pentium® processor*	RAM	HD	CD	Display	Price
#99536	7350MT	166MHz MMX*	32	2.1GB	—	12.1" TFT	\$2,099
#24711	7360DM	200MHz MMX*	32	3.0GB	20X	12.1" TFT	\$3,369
#24712	7370DMT	233MHz MMX*	32	4.0GB	20X	12.1" TFT	\$4,249
#26787	7380DMT	266MHz MMX*	32	4.0GB	20X	12.1" TFT	\$4,549
#26788	7380DMT	266MHz MMX*	32	4.0GB	20X	12.1" TFT	\$4,699

Armada 7700 Series

Order#	Model	Pentium® processor*	RAM	HD	CD	Display	Price
#94060	7710MT	150MHz MMX*	16	1.6GB	—	12.1" TFT	\$1,949
#94046	7750MT	166MHz MMX*	32	2.1GB	—	12.1" TFT	\$3,549
#24713	7790DMT	233MHz MMX*	32	5.0GB	20X	13.3" TFT	\$4,799
#23932	7790DMT	233MHz MMX*	32	3.0GB	20X	12.1" TFT	\$3,799
#26790	7792DMT	266MHz MMX*	32	5GB	20X	13.3" TFT	\$5,049
#26789	7792DMT	266MHz MMX*	32	5GB	20X	13.3" TFT	\$5,199

*Pentium® processor with MMX™ technology.

COMPAQ Desktops for Business and Home!

Deskpro 2000 Series

Order#	Pentium® Processor	RAM	HD	CD	Form Factor	Price
#97423	166MHz MMX*	16	3.2GB	—	DT	\$849
#97426	200MHz MMX*	32	3.2GB	—	DT	\$999
#97427	200MHz MMX*	32	3.2GB	16X	MT	\$1,149
#97428	233MHz MMX*	32	3.2GB	16X	DT	\$1,199
#14643	P11 233MHz MMX*	32	3.2GB	16X	DT	\$1,499
#14641	P11 266MHz MMX*	32	3.2GB	16X	DT	\$1,699
#14637	P11 300MHz MMX*	32	3.2GB	16X	MT	\$1,999

Deskpro 4000 Series

Order#	Pentium® Processor	RAM	HD	CD	Form Factor	Price
#97430	166MHz MMX*	32	3.2GB	—	DT	\$1,099
#97442	200MHz MMX*	32	2.4GB	—	DT	\$1,149
#97421	233MHz MMX*	32	3.2GB	16X	MT	\$1,349

Deskpro 4000 Series (Continued)

Order#	Pentium® Processor	RAM	HD	CD	Form Factor	Price
#14633	P11 233MHz	32	3.2GB	16X	MT	\$1,649
#14635	P11 266MHz	32	3.2GB	16X	MT	\$1,849
#14625	P11 300MHz	32	3.2GB	16X	DT	\$2,099
#27833	P11 333MHz	32	3.2GB	16X	DT	\$2,349

Presario Desktops featuring 400MHz PIII

Order#	Model	Pentium® processor	RAM	HD	CD	Modem	Price
#27283	2240	200MHz AMD-K6 MMX*	32	2.1GB	20X	56K	\$749
#25867	4540	233MHz AMD-K6 MMX*	32	3.2GB	20X	56K	\$949
#25868	4550	233MHz AMD-K6 MMX*	32	4.0GB	24X	56K	\$1,099
#25869	4640	P11 266MHz MMX*	32	4GB	DVD	56K	\$1,499
#25871	4660	P11 300MHz MMX*	64	8GB	DVD	56K	\$1,799
#25872	4860	P11 333MHz MMX*	64	8GB	DVD	56K	\$2,299
#25967	4880	P11 400MHz MMX*	64	12GB	DVD	56K	\$2,999

*Pentium® processor with MMX™ technology.

IBM Networking Solutions Designed for Your Business

IBM PC300PL

Order#	Model	Pentium® processor*	RAM	HD	CD	Display	Price
#99882	656246U	166MHz MMX*	32	2.5GB	—	—	\$1,139
#99888	656234U	200MHz MMX*	32	2.5GB	—	—	\$1,149
#99886	656236U	200MHz MMX*	32	4.2GB	—	—	\$1,199
#99884	656238U	200MHz MMX*	32	4.2GB	24X	—	\$1,289

as low as
\$1,139!
#99882



Monitor sold separately.

IBM PC300GL

- Up to P11 266MHz Pentium Processor w/ MMX technology
- 16 or 32MB RAM
- 2.5 to 4.2GB EIDE HD
- 256K L2 Cache
- 16X CD-ROM (selected models)

as low as
\$829!
#98201



Order#	Model	Pentium® Processor	RAM	HD	CD	Price
#96201	628269U	166MMX*	16MB	2.5GB	—	\$829
#14853	628275U	200MMX	32MB	2.5GB	—	\$979
#96203	628268U	200MMX*	32MB	2.5GB	16X	\$1,079
#15126	628278U	200MMX	32MB	2.5GB	16X	\$1,149
#15124	628286U	233MMX	32MB	2.5GB	—	\$1,029
#27406	656113U	P11233	32MB	2.5GB	—	\$1,129
#27407	656132U	P11266	32MB	2.5GB	—	\$1,199
#27408	656134U	P11266	32MB	4.2GB	—	\$1,239
#27409	656135U	P11266	32MB	4.2GB	—	\$1,299

*Pentium® Processor with MMX™ technology †MiniTower Systems.

HP Business Series Desktops

- 200 - 233MHz Pentium processor with MMX™ technology
- 16 - 32MB RAM expandable to 128MB
- 2.1 - 3.2GB hard drive
- 24X CD-ROM (Selected models)

Monitor sold separately
as low as
\$1,059!
#27301

Order#	Model	Pentium® processor	RAM	HD	CD	NIC	Price
#27301	D5605A	200 MMX*	32	3.2GB	—	—	\$1,059
#27304	D5612A	233 MMX*	16	2.1GB	—	—	\$1,059
#27314	D5616N	233 MMX*	32	3.2GB	—	—	\$1,239
#27308	D5613A	233 MMX*	16	2.1GB	—	10/100	\$1,129
#27311	D5614A	233 MMX*	32	2.1GB	24X	—	\$1,289

HP Brio Business Series

Business Models							
#99511	8012	166MHz MMX*	16MB	2.1GB	—	—	\$849
#99512	8014	200MHz MMX*	16MB	2.1GB	—	—	\$899
#99513	8017	233MHz MMX*	32MB	3.2GB	—	—	\$1,079
Advanced Business Models							
#99514	8032	166MHz MMX*	16MB	2.1GB	16X	—	\$1,019
#99515	8034	200MHz MMX*	32MB	2.1GB	16X	—	\$1,199
#99483	8037	233MHz MMX*	32MB	3.7GB	24X	—	\$1,299

Any Price!

business. Call us... and we'll give you the best price anywhere!

Ink Jet Printers

HP DeskJet 400L Printer

- 600 x 300dpi, up to 3ppm black
- 300dpi color prints with optional Color Kit
- Easy installation with on-screen help
- Windows 95, 3.1 or up DOS 3.3 or up

only **\$99⁹⁹!**

Factory Refurbished
While supplies last! 1 Year Warranty

#94713	HP DeskJet 672C 600dpi black up to 4ppm, 600x300dpi color up to 1.5ppm	\$199⁹⁹
#91234	HP DeskJet 694C 600dpi, 6ppm black, 3.5ppm color FREE Photo Kit	\$239⁹⁹
#14696	HP DeskJet 340 Portable Printer up to 3ppm/FREE Color Kit	\$269⁹⁹
#14434	HP DeskJet 722C PhotoRet II, 8ppm black, 4ppm color	\$299⁹⁹
#14435	HP DeskJet 890Cse PhotoRet II, 9ppm black, 5ppm color	\$399⁹⁹
#20381	HP DeskJet 1120Cse Printer, prints 4" x 6", up to 13" x 19" NEW!	\$499⁹⁹
#14717	HP OfficeJet 600 printer, copy and scan in color, Plain-paper fax	\$499⁹⁹

EPSON		
#90223	Stylus Color 800 Printer 720x720dpi, 4ppm black, 3ppm color	\$179⁹⁹
#90224	Stylus Color 800 Printer 1440x720dpi, 6ppm black, 4ppm color	\$249⁹⁹
#90225	Stylus Color 800 Printer 1440x720dpi, 8ppm black, 7ppm color	\$349⁹⁹
#30666	Stylus Color 850 Printer 1440x720dpi, Increased Performance	\$399⁹⁹

Memory Blowout!

16MB as low as \$39!

#65416	16MB 4x32 60ns 72 pin	\$39
#96772	16MB 4x32 EDO 60ns 72 pin	\$39
#65417	32MB 8x32 60ns 72 pin	\$79
#96773	32MB 8x32 EDO 60ns 72 pin	\$79

Monitors

Sony MultiScan 15" 100sx Trinitron Display
11.3" Viewable image
1280 x 1024 max. res.
125mm dot pitch

SONY
only **\$199⁹⁹**

#23973 **\$399⁹⁹**

#23975 MultiScan 200sx Trinitron, 17/15.9", 1280 x 1024, 25mm
Both monitors are factory refurbished, while supplies last

Sony Graphic Displays - New Low Prices!

#23940	CPD-100ES 15/14"	1280 x 1024	0.25mm	\$299⁹⁹
#24061	CPD-200ES 17/16"	1280 x 1024	0.25mm	\$399⁹⁹
#24062	CPD-200GS 17/16"	1280 x 1024	0.25mm	\$699⁹⁹
#24063	CPD-400PS 19/18"	1600x 1200	0.25mm	\$999⁹⁹
#24064	GDM-500PS 21/20"	1600 x 1200	0.25mm	\$1,499⁹⁹

ViewSonic®					
#25426	G5771	17"/16"	1280 x 1024	0.27mm	\$469 ⁹⁹
#97567	G771	17"/16"	1280 x 1024	0.27mm	\$474 ⁹⁹
#95864	G773	17"/16"	1280 x 1024	0.26mm	\$469 ⁹⁹
#24073	G790	19"/18.5"	1600 x 1280	0.26mm	\$699 ⁹⁹
#94845	P616	21"/20"	1600 x 1280	0.25mm	\$1,299 ⁹⁹

OPTIQUEST.					
#15471	041	14"/13.2"	1024 x 768	0.28mm	\$169⁹⁹
#15472	051	15"/13.7"	1024 x 768	0.28mm	\$169⁹⁹
#20511	053	15"/13.8"	1280 x 1024	0.28mm	\$229⁹⁹
#30055	071	17"/16"	1280 x 1024	0.28mm	\$369⁹⁹
#24426	V773	17"/16"	1280 x 1024	0.26mm	\$449⁹⁹

Video Cards

#13822	Jazz Multimedia Adrenaline Rush 3D-3DFX GMB	\$189⁹⁹
#15292	Matrox M3D Upgrade 4MB	\$99⁹⁹
#25257	ATI All-in-Wonder Pro, 4MB w/Director 5.0	\$289⁹⁹
#20525	3D Blaster, Voodoo 2, 8MB Price after \$30 mail-in rebate	\$189⁹⁹

Digital Cameras

Casio QV-120 High Resolution Digital Camera

1/4" x 480 only **\$249⁹⁹**

#90543 **\$499⁹⁹**

11.8" LCD Screen Limited Time Offer!

#90265 Sony Digital Mavica Floppy Disk Camera **\$499⁹⁹**

#20215 Kodak DC200, 1152 x 864, 4MB, fixed focus **\$599⁹⁹**

#14495 Olympus D320L 1024 x 768, 4MB NEW LOW PRICE! **\$599⁹⁹**

#25783 NEW! HP PhotoSmart C20 Digital Camera, 1152 x 872, 4MB, 1.8" LCD **\$699⁹⁹**

Laser Printers

HP LaserJet 6L Printer

- 600 x 600dpi with greater than 128 distinct levels of gray
- 6 ppm with 24MHz processor
- First page out in 18 seconds
- Optional Companion se (#95589)

now only **\$339⁹⁹!**

Factory Refurbished, 1 Year Warranty, While supplies last!

#95513	HP LaserJet 6Lse Printer 600dpi, up to 6ppm	\$399⁹⁹
#95532	HP LaserJet 6Pse 600dpi, 8ppm printing w/24MHz processor	\$799⁹⁹
#73846	HP LaserJet 5 Printer 600dpi, 12ppm, 4MB RAM	\$1,049⁹⁹
#22980	HP LaserJet 4000se 1200dpi, 17ppm, 4MB, 500 sheet paper tray	\$1,149⁹⁹
#22658	HP LaserJet 4000M 8MB RAM/HP JetDirect Pro Server	\$1,499⁹⁹
#20432	HP LaserJet 5800 11" x 17", 16ppm, 4MB NEW!	\$1,499⁹⁹
#77088	HP LaserJet 5Si 600dpi, 24ppm printing, 40MHz, 4MB	\$2,449⁹⁹
#73342	HP Color LaserJet 5 Printer 1200dpi, 10ppm black 3ppm color	\$3,959⁹⁹

LEXMARK		
#96777	Optra E+ 600dpi, 6ppm, 2MB	\$378⁹⁹
#25048	Optra S1620 16ppm, 1200x1200dpi	\$999⁹⁹
#25050	Optra S2420 24ppm, 1200x1200dpi, 4MB	\$1,599⁹⁹
#25793	Optra SC1275 1200dpi, 16MB, factory refurbished	\$2,699⁹⁹
#96786	Optra SC1275N Color Laser 32MB, Ethernet Ready	\$3,499⁹⁹

Removable Drives

Imaging Jaz 1GB Drives

as low as **\$199⁹⁹**

Includes 1 FREE 1GB Cartridge!

External SCSI #15813		Internal SCSI #24981
#26662	Dimo 2GB Internal Factory Refurbished Tape Drive	\$189⁹⁹
#26663	Dimo 2GB External Factory Refurbished Tape Drive	\$189⁹⁹
#14647	ZpPlus+ 100MB Drive w/cartridge	\$199⁹⁹
#15423	Jaz 2GB internal SCSI drive	\$249⁹⁹
#15424	Jaz 2GB external SCSI drive	\$249⁹⁹

SYQUEST SparQ 1.0GB Drive	
#23899	SparQ 1.0GB External Drive, Parallel Port
#23901	SparQ 1.0GB Cartridge -3 pack

MICROTECH

MicroZip
The World's Smallest Zip Drive

only **\$299⁹⁹!**

#28783

Includes 1 FREE Cartridge
No AC adapter required
Requires Notebook with a PCMCIA slot 1 Weighs only 1 lb.

Hard Drive Blowout!

Seagate Drives as low as \$129⁹⁹!

#27820	Seagate 21GB EIDE, Ultra DMA, 12ms seek time, 4500RPM	\$129⁹⁹
#90694	Seagate 25GB EIDE, 12ms seek time, 4500RPM	\$139⁹⁹
#26125	Seagate 32GB EIDE Ultra DMA, 12ms seek time, 4500RPM	\$159⁹⁹
#30039	Seagate 6.4GB EIDE Ultra DMA, 9.5ms seek time, 5400RPM	\$219⁹⁹

CD-ROM/DVD-ROM

16X Multimedia Kit only \$69⁹⁹!

Internal EIDE, Includes Sound Card, Speakers, 50 Software Titles

#30738

After \$30 mp3 mail-in rebate 1 year S & H

24X Drives

EIDE/ATAPI Interface Internal **\$49⁹⁹!**

5 Year Warranty

#14216

DVD Drives PC-DVD Encore DXR2

4.7GB Capacity **\$299⁹⁹!**

EIDE/ATAPI Interface 20X/2X

#24209

NEW! Palm III Organizer

2MB, backlit screen **\$399⁹⁹!**

Flash Memory **\$399⁹⁹!**

Infrared beaming **\$30738**

#88141 PalmPilot Personal Ed., w/512K RAM **\$199⁹⁹**

#88142 PalmPilot Professional Ed., w/1MB RAM **\$299⁹⁹**

Zip 100MB Drive Blowout!

only **\$79⁹⁹!**

100MB Cartridge included!

Microsoft Windows 98

only **\$89⁹⁹**

#30468 Upgrade CD

NEW Windows 98!

It's the software release of the year. Windows 98 contains 1,000 enhancements to integrate your desktop to the Web and boost system performance. Reserve your copy today! Call PC Mall!

#30469 Windows 98 CD **\$179⁹⁹**

Modems and PC Cards

3Com USRobotics 56K Standard Fax Modem External

only **\$177⁹⁹**

#26290

#25306	USRobotics 56K Standard Fax Modem, Internal	\$157⁹⁹
#25303	USRobotics 56K Standard Win Modem, Internal	\$97⁹⁹
#25304	USRobotics 56K Standard Fax/Voice Modem, Internal	\$177⁹⁹

3Com/Winmodem PC Card Modems

#27524	16/100 LAN + 56K PC Card Modem	\$354⁹⁹
#27523	10MBPS LAN + 56K PC Card Modem w/XJACK	\$324⁹⁹
#94810	56K PC Card Modem w/XJACK	\$224⁹⁹

Scanners

Astra 610P Scanner

30-bit letter size color scanner
300 x 600 optical resolution
4800dpi maximum
8.5" x 11.7" scanning area (Price reflects \$30 max. rebate Valid 5/1/98-4/30/99)

only **\$99⁹⁹**

#25523

#16323	Umax Astra 1210P - 30-bit, 600x1200dpi, 9600 max dpi (parallel)	\$189⁹⁹
#29046	Umax 1220P - 36-bit, 600x1200dpi optical, 9600 max dpi, 8.5" x 17"	\$199⁹⁹
#94312	Umax 1200S - 30-bit, 600x800dpi optical, 9600 max dpi (SCSI)	\$249⁹⁹

#25471 HP ScanJet 5100Cse Scanner 36-bit Color Image Processor **\$299⁹⁹**

#99525 HP ScanJet 6100Cse Scanner 45-bit Color Image Processor **\$799⁹⁹**

Thousands of software titles available! Call Today!

FREE maxell

Maxell 20-Pack Color Disks w/any purchase

PC formatted Add item #28001 to your order Charge \$5.00 - receive a mail-in rebate coupon for \$5.00 with your order. Your first order \$5.00 - receive one pack per order. Rebate coupon must be received by 6/30/98. While supplies last.

FREE Super 6 Surge Suppressor w/any purchase

Provides Surge & Noise Suppression
6 Outlets 1 3/12" Cord
Surge Suppression up to 360 Joules
S & H applies. Ask for Item #28348

No Credit Card Surcharges

VISA MasterCard American Express Discover!

We accept Visa, MasterCard, American Express and Discover!

Open Account. PC Mall offers Net 15-day terms to government agencies, schools and businesses with instant approval to qualified customers. Your Personal Account Executive can assist you in your application. Please allow up to 3 days for credit approval.

Leases. Lease anything from one PC to one hundred at truly affordable rates! Volume Licensing. Supply your entire office with the latest software versions for less! Call for details.

Exclusive Deals All the Time!

Your Account Executive knows which prices just went down and which inventory must sell. With 45,000 products in available inventory, we can always find you a great deal!

Call Today to Get Your **FREE PC Mall and DataCom Mail Catalogs!**



Order Any Time! Open 24 Hours.

1-888-901-MALL

Order Today by 10 pm EST—Get It Tomorrow by 10:30 am

www.pcmall.com Use Source Code #ZPCM852

Choose 330 at www.pcmag.com/infolink

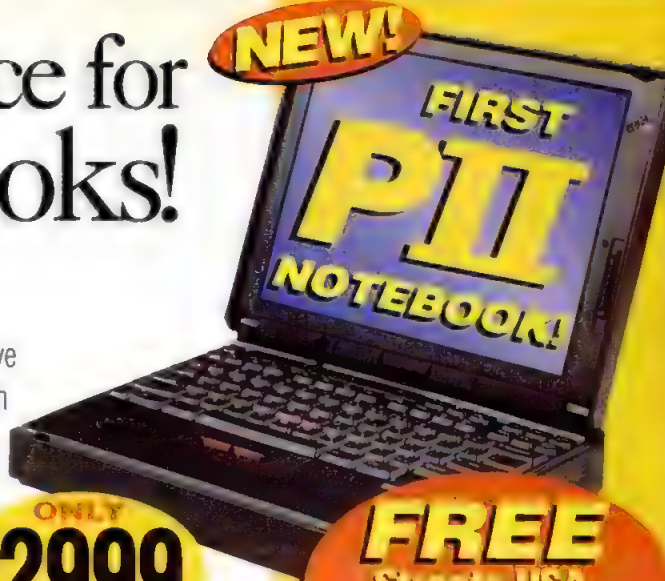
The PC Zone

Your Source for Notebooks!

NEW!

IBM ThinkPad 380XD

- 233MHz Intel® Pentium® II processor
- 4.0GB removable hard drive storage
- 32MB SDRAM, expandable to 96MB
- 24X-10X CD-ROM drive
- 12.1" SVGA screen with new High Performance Addressing technology
- 2MB video memory
- Native USB port



ONLY \$2999
Item #01010

FREE Streets USA

Satellite Pro 440 CDT

- 133MHz Intel® Pentium® processor with MMX™ technology
- 1.34GB hard drive
- 16MB RAM, exp. to 144MB
- 12.1" SVGA TFT display
- 10X CD-ROM drive



ONLY \$1699
Item #44990

TOSHIBA

Presario 1681

- 233MHz Intel® Pentium® processor with MMX™ technology
- 3.2GB hard drive
- 48MB RAM, exp. to 96MB
- 12.1" TFT display
- 20X CD-ROM, 56K modem



Product shown is representative only

ONLY \$2999
Item #53088

COMPAQ

Tecra 550CDT

- 266MHz Pentium® processor with MMX™ technology
- 3.82GB hard drive
- 32MB EDO DRAM, expandable to 160MB
- 12.1" XGA TFT display
- 20X max. CD-ROM



ONLY \$3899
Item #56435

TOSHIBA

Armada 1560DM

- 166MHz Intel® Pentium® processor with MMX™ technology
- 3.1GB hard drive
- 16MB RAM, expandable to 80MB
- 12.1" CSTN dual scan display
- 20X CD-ROM & integrated 56K modem



ONLY \$1999
Item #53094

COMPAQ

NorthStar NSL75

- 233MHz Intel® Pentium® processor with MMX™ technology
- 3.3GB hard drive
- 32MB RAM, exp. to 128MB
- 12.1" TFT SVGA display
- 20X CD-ROM
- 33.6K fax/modem
- Office 97 Pro preinstalled



ONLY \$2999
Item #58377



LifeBook 765Dx

- 166MHz Intel® Pentium® processor with MMX™ technology
- 2.0GB hard drive
- 16MB RAM expandable to 80MB
- 12.1" HSTN display
- 20X CD-ROM drive; 56K modem



ONLY \$1499
Item #58225

FUJITSU

FREE CATALOG!

Call Today 1-800-258-8088



With over 20,000 products, we are **THE SOURCE** for your computer hardware and software needs. Call us today!



SOURCE CODE PMB805

1-800-258-8088
www.pczone.com

Corporate, Education and Government bids welcome!
Fax your purchase orders to 1-425-430-3420



NO SURCHARGE on CREDIT CARDS

A NASDAQ COMPANY

Credit cards are not charged until the order is shipped. Most products ship the same day (barring system failure, etc.). Shipping options include Ground, 2nd Day and Overnight delivery. Freight is based on average product weight. Handling extra. Insurance available. Special orders may require special shipping and handling charges. Please call for international shipping rates. Prices and product availability subject to change without notice. Specials and promotions may be limited to stock on hand. Not responsible for typographical errors.

© 1998 Multiple Zones International, Inc. All rights reserved. Unauthorized duplication is a violation of applicable laws. Dana Commercial Credit Business Lease: 36-month, full-payout lease with \$1 purchase option based on approved credit (\$1250 minimum lease amount). Other leasing options available. Administered by Dana Commercial Credit Corporation.

Choose 068 at www.pcmag.com/infolink

Replace Your Hard Drive, Not Your Notebook!

INFINITY FEATURES

High Capacity

Available in sizes:

2.16 GB

3.08 GB

4.09 GB **NEW!**

5.10 GB **NEW!**

Removable

Plug and Play design.

Easy Installation

EZ-Drive software overcomes BIOS limitations for a fast, one-stop installation.

High Performance

Fast 16.6 or 33.3 megabyte per second average transfer rate.

High Quality

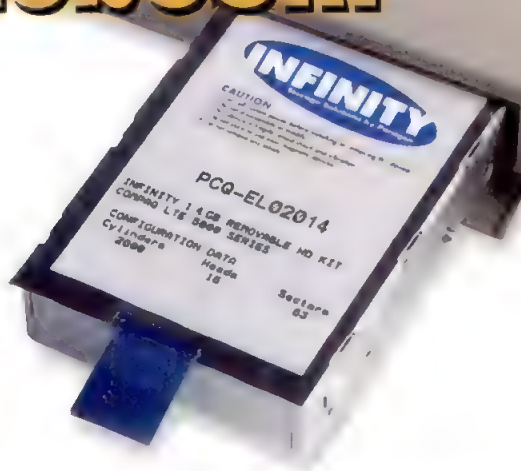
Backed by a 3 year warranty and lifetime toll-free technical support.

Compatibility

With DOS, Windows, Windows 95, Windows NT, and OS/2 Warp.

Transportability

Take all your large files on the road.



Size Matters.

When it comes to your hard drive's storage capacity, *bigger is always better*. Paragon leads the way in high capacity, mobile storage with the introduction of the *New Infinity 4.0 GB and 5.1 GB* notebook drive upgrades. The latest *Infinity* drives include performance enhancements such as an increased data buffer size (now 512KB), a new Interface Transfer Rate of 33.3 MB/second and other superior drive technologies to meet the demanding requirements of today's data intensive applications.

Infinity notebook drives from Paragon provide a removable, replacement hard drive designed specifically for your portable computer that allows you to increase your storage capacity. And, because *Infinity* notebook drives replace your internal hard disk, there are no external devices, disks, or power supplies to transport.

Now, upgrade with any *Infinity* notebook hard drive and receive up to \$50 cash back when you trade-in your existing notebook hard drive. Hurry, our offer ends June 30, 1998.

Choose 014 at www.pcmag.com/infolink

Up To
\$50
Cash Back*

SYSTEMS / MODELS	2.16GB	3.08GB	4.09GB	5.10GB
INFINITY SKU				
AST SOLUTIONS				
Ascenta J Series	PAS-A501021	PAS-A501030	PAS-A501040	PAS-A501050
COMPAQ SOLUTIONS				
Armado 4100 Family	PCQ-AR01021	PCQ-AR01030	PCQ-AR01040	N/A
UTE Elite Series	PCQ-EL01021	PCQ-EL01030	PCQ-EL01040	PCQ-EL01050
DELL SOLUTIONS				
Latitude 301	PDL-LA01021	PDL-LA01030	PDL-LA01040	N/A
GATEWAY 2000 SOLUTIONS				
Colorbook Series	PGW-CB01021	PGW-CB01030	PGW-CB01040	N/A
HEWLETT PACKARD SOLUTIONS				
Compaq 5300 Series	PWP-CB01021	PWP-CB01030	PWP-CB01040	N/A
IBM SOLUTIONS				
ThinkPad 701 Series	PB-TP02021	PB-TP02030	PB-TP02040	N/A
ThinkPad 365	PB-TP04021	PB-TP04030	PB-TP04040	PB-TP01050
NEC SOLUTIONS				
Nova 2400 2500 Series	PNC-V503021	PNC-V503030	PNC-V503040	N/A
TOSHIBA SOLUTIONS				
Satellite 710 720 730 740	PTS-TS01021	PTS-TS01030	PTS-TS01040	PTS-TS01050
Portege 660	PTS-TS03021	PTS-TS03030	PTS-TS03040	N/A
Satellite Pro 400 410 430 200 110 100	PTS-TS05021	PTS-TS05030	PTS-TS05040	N/A
Satellite Pro 220 225 420 440 460 480	PTS-TS06021	PTS-TS06030	PTS-TS06040	N/A



Upgrade to Excellence

To Locate A Dealer Near You,

Call Paragon.

(800) 643-8886

www.paragonmem.com

USA FLEX

800-777-2450
www.usaflex.com

PC Mail

800-555-6255
www.pcmall.com

TigerDirect

800-888-4437
www.tigerdirect.com

PC Zone

800-258-2088
www.pczone.com

MicroWAREHOUSE

800-367-7880
www.microwarehouse.com

ELEKTEK

800-897-1317
www.elektel.com

firstsource.com

800-279-9886
www.firstsource.com

PC Connection

888-800-4509
www.pcconnection.com

ComputAbility

800-554-2185
www.computability.com

NECX

800-806-3375
www.necx.com

To Order, Contact One Of These Paragon Authorized Resellers.

Paragon Memory Corporation • 7 Journey • Aliso Viejo, California 92656 • (714) 643-8844 Fax: (714) 643-8855 • *Contact Paragon for complete trade-in rebate details

© Paragon Memory Corporation. All specifications subject to change without notice. Infinity is a trademark of Paragon Memory Corporation. Trademarks and registered trademarks are properties of their respective companies.

Great Deals on Brand

Microsoft • Digital • Compaq • IBM • Hitachi • Toshiba • Hewlett Packard

Seagate Medalist Hard Drives

Hard drives as low as
\$139.95!



DR7324-1.7GB\$139.95
DR7251-2.1GB\$149.95
DR7252-4.3GB\$209.95
DR7335-6.4GB\$269.95

Microsoft Office 97 Upgrade

As low as
\$179.95!
\$124.42

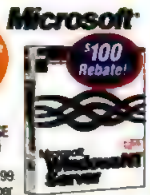


Microsoft

*Price after publisher's \$40 mail-in upgrade rebate. Price before rebate is \$219.95. Offer expires 12/30/98.

Microsoft Windows NT Server 4.0

Full version
\$599.95!
NT8137



*Price after MicroWAREHOUSE \$100 mail-in rebate. Rebate applies to full version only. Price before rebate is \$699.99. Expires 5/31/98. Limit one per customer. Ask for coupon AA0850.

Olympus Digital Cameras

As low as
\$399.95!
MP1363



D-220L features:
• 640 x 480 pixels
• 2.0" LCD monitor
• 6MB SmartMedia Card: #MY8034 — \$129.95!
*Price for Olympus D-220L, Item # INP1303. Olympus D-800L with 3x Zoom (shown) only \$1299.95. Item # IN8000.

APC Back-UPS 200VA

Only
\$79.99!
DUP1159



The BackUPS line features full-line surge suppression and filtering, user-replaceable batteries, time-adjustable option switches, and site wiring fault indicator.

APC Back-UPS 280: #DUP1180 — \$89.99!

HP LASERJET 4000SE PRINTER

ONLY \$1149.00!
• Prints 17ppm • 100MHz RISC processor!
• High-resolution printing at 1200dpi
• 4MB standard RAM (100MB max.)
• Manufacturer's one-year warranty
ASK FOR ITEM # PR12977.

HP LaserJet 4000N, Includes Ethernet/LocalTalk card. Ask for item # PR12975. ONLY \$1420!



CALL TODAY!

FREE COMPAQ V50 MONITOR!

Buy the DeskPro 2000 and get a free 14" Compaq V50 monitor! (A \$289 value.)

• 233MHz Pentium® II processor • 2.1GB HDD
• 32MB SDRAM • Intelligent Manageability

only \$1299!
ITEM # 20000

*Promotional offer valid through 5/31/98, or while supplies last.

COMPAQ



USR V.90 56K FAX/MODEM
ONLY \$159!
INTERNAL ITEM # DMD3442.
EXTERNAL (SHOWN) ONLY \$179.99!
ASK FOR ITEM # DMD3441.

IBM THINKPAD 380ED

IBM.

- 166MHz Pentium® processor with MMX™ • 2.1GB hard drive
- 32MB RAM • 20X CD-ROM drive
- 12.1" FRSTN color display

Only
\$1699!
Item # CP5620



TOSHIBA SATELLITE PRO 460CDX

TOSHIBA

- 166MHz Pentium® processor with MMX™ • 2.0GB hard drive
- 32MB RAM • 10X CD-ROM
- 12.1" FAST SCAN Display

Only
\$1699!
Item # CP6488



HP BRIO 8317

HEWLETT PACKARD

- 266MHz Pentium® II processor
- 4.0GB hard drive
- 32MB RAM • Mini-tower
- 3-year manufacturer's warranty

Only
\$1499!
Item # CP7031

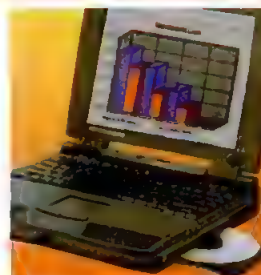


HITACHI VISIONBOOK PLUS 5260

HITACHI

- 166MHz Pentium® processor with MMX™ • 2.1GB hard drive
- 16MB RAM • 56Kbps modem
- 12.1" HPA display • 20X CD

Only
\$1599!
Item # CP7035



■ Visa and MasterCard accepted. Your credit card will not be charged until your order is shipped.

■ Purchase orders subject to credit approval.

■ Shipping charge is \$9.95 per order up to 5lbs. For all orders over 5lbs., shipping is \$9.95 plus an additional \$1.25 per pound or fraction thereof. Please add an additional \$3.00 handling charge for all orders under \$50.

■ We reserve the right to limit quantities.

■ All products covered by 30-day limited warranty. Defective software replaced immediately. Hardware replaced or repaired at our discretion, except for IBM or COMPAQ. If your IBM hardware is defective call IBM directly at 1-800-428-7378. If your COMPAQ hardware is defective call COMPAQ directly at 1-800-452-6672. These manufacturers will repair or replace products at their sole discretion. If you return hardware to MicroWAREHOUSE from either IBM or COMPAQ it will be assessed for a 15% restocking fee which will be charged to your account.

■ Connecticut, New Jersey, Illinois, Ohio & Washington residents add applicable sales tax.

■ Some products not available outside U.S. Please call for more information.

■ Orders for "in-stock" items placed by 12:00 midnight (E) weekdays, (bearing system failure, etc.) ship overnight by Airborne Express. (Some areas require an extra day.)

■ Alaska, Hawaii, outside continental U.S., APO/FPO call for information.

■ UPS ground service also available at current UPS rates plus \$2.95 handling charge per order (except COD). UPS orders for "in-stock" items placed by 3:00 p.m. (E) weekdays ship same day.

■ Actual freight charges apply for computers, hard disks, tape backups, monitors, and printers.

■ Item availability and price subject to change without notice.

■ Not responsible for typographical errors or omissions.



We accept these major credit cards.

MicroWAREHOUSE

Name Products!



3Com • Iomega • Epson • Microtek • ACER • APC • Viewsonic • USRobotics

Compaq Color Notebook BLOWOUT!

COMPAQ

3COM PALM III
ONLY \$379!

ASK FOR ITEM # PM0200

NEW Slim profile! • Backlit display for easy viewing
• Holds 6,000 records • Infrared port for wireless printing and file transfer

only \$1399!

COMPAQ 7330T ARMADA
ONLY \$1399!

- 100MHz processor with MMX
- 16MB RAM • 2.1GB hard drive
- 33.6 modem card • 20X CD-ROM
- 12.1" TFT color display

ASK FOR ITEM # BM4916

EPSON

EPSON STYLUS COLOR 600
ONLY \$249!

- 1440 • 720dpi resolution
- 6ppm black/4ppm color
- Windows and Macintosh compatible

ASK FOR ITEM # PR12126

LAPTOPS IBM COMPAQ TOSHIBA

CP5620: IBM Thinkpad 380ED 166MHz Pentium® MMX Processor, 2.1GB HDD, 16MB, 12.1" FRSTN, 8-20X CD	\$1699.00
CP5195: IBM Thinkpad 390TX 233MHz Pentium® MMX Processor, 4.0GB, 32MB, 13.1" VGA TFT	\$3399.00
CP5624: IBM Thinkpad 770 233MHz Pentium® MMX Processor, 5.1GB, 32MB, 14.1" XGA TFT	\$4899.00
CP5635: Toshiba Satellite Pro 4400CD, 133MHz Pentium® w/MMX, 10MB, 1.34GB HDD, 10X CD, 12.1" FlatScreen	\$1299.00
CP5210: Toshiba Pro 4400CT, 133MHz Pentium®, 16MB, 1.34GB, 10X CD, 12.1" TFT, 33.6	\$1899.00
CP5446: Toshiba Satellite Pro 4900CD, 166MHz Pentium® w/MMX, 32MB, 2.0GB HDD, 10X, 12.1" FRST SCAN	\$1899.00
CP5487: Toshiba Satellite Pro 4800CT, 233MHz Pentium® w/MMX, 32MB, 3.8GB HDD, 10X, 12.1" SVGA TFT	\$3399.00
CP5655: Compaq Armada 1540DM, 150 MMX Processor, 16MB, 2.1GB HDD, 12.1" DSTN	\$1799.00
CP6706: Compaq Armada 1560DM, 166MHz Pentium® w/MMX, 16MB, 3.1GB HDD, 20X, 12.1" SVGA CSTN	\$1899.00
CP5856: Compaq Armada 1580DM, 166 MMX Processor, 16MB, 2.1GB HDD, 12.1" TFT	\$2599.00

DESKTOPS IBM COMPAQ HEWLETT PACKARD

CP5252: Compaq Deskpro 2000 200MHz Pentium® MMX Processor, 16MB, 2.1GB, Desktop	\$899.00
CP5254: Compaq Deskpro 2000 233MHz Pentium® MMX Processor, 32MB, 2.5GB, 140X, Desktop	\$1199.00
CP5627: Compaq Deskpro 2000 266MHz Pentium® II Processor, 32MB, 3.2GB, 24X, Mini-tower	\$1739.00
CP5628: Compaq Deskpro 2000 300MHz Pentium® II Processor, 32MB, 3.2GB, 24X, Mini-tower	\$1999.00
CP5256: Compaq Deskpro 4000 200MHz Pentium® MMX Processor, 32MB, 2.4GB, Desktop	\$1149.00
CP5658: IBM 300GL 233MHz Pentium® II MMX Processor, 16MB, 2.5GB, MT, 6X8, Win 95	\$1189.00
CP5661: IBM 300GL 233MHz Pentium® II MMX Processor, 32MB, 2.5GB, DT, 4X4, Win 95	\$1259.00
CP5668: IBM 300GL 233MHz Pentium® II MMX Processor, 32MB, 4.2GB, MT, 6X8, Win 95	\$1329.00
CP7030: HP Brio 8316, 233MHz Pentium® II Processor, 32MB, 4.0GB, Win 95	\$1299.00
CP7031: HP Brio 8317, 266MHz Pentium® II Processor, 32MB, 4.0GB, Win 95	\$1499.00
CP7033: HP Brio 8338, 300MHz Pentium® II Processor, 32MB, 8.0GB, 32X, MS Word 97	\$1969.00

SCANNERS HP HEWLETT PACKARD MICROTEK

W5000 HP ScanJet 5000SE NEW!	\$1299.00
W5468 HP ScanJet 6100CSE	\$299.95
W5479 HP ScanJet 6100CSE	\$799.00
W5479 HP ScanJet 6100CSE	\$118.99
W5479 HP ScanJet 6100CSE	\$149.95

*Price after mfr's \$70 mail-in rebate. Price before rebate is \$199.00. Offer expires 9/14/98. Ask for coupon # A00570.
*Price after mfr's \$30 mail-in rebate. Price before rebate is \$149.95. Offer expires 9/31/98. Ask for coupon # A00568

PRINTERS HP HEWLETT PACKARD LEXMARK

PR1247T HP LaserJet 4000 Series Printer 10ppm/200dpi	\$1149.99
PR12864 HP DeskJet 723C Color Inkjet Printer	\$299.00
PR13912 Lexmark Optra S 1620 1600 Laser Printer NEW!	\$599.95
PR13034 Lexmark Optra S 2420 2400 Laser Printer	\$1549.95

MONITORS NEC OPTIQUEST.

MT1544 15" 15" 13.8" viewable, 1280 x 1024 @ 60Hz	\$289.95
MT1546 A700 17" 15.8" viewable, 1280 x 1024 @ 60Hz	\$329.95
MT1545 Optique Q53 15", 13.8" viewable, 1280 x 1024 @ 60Hz	\$219.95
MT1580 Optique V95, 19", 18" viewable, 1600 x 1200 @ 75Hz	\$739.95

MODEMS USRobotics Megahertz

DM33442 US Robotics 56K Fax/modem - internal	\$159.99
DM33441 US Robotics 56K Fax/modem - external	\$179.99
DM3205 56.6K PC Card w/K-Jack for Windows	\$179.99
DM3277 56.6K PC Card w/K-Jack	\$199.99

STORAGE Seagate

DS541 Seagate Barracuda II 1GB Ultra SCSI Hard Drive ST1917N	\$789.95
DS540 Seagate Barracuda II 500MB Ultra SCSI Hard Drive ST1917N	\$709.95
DS551 Seagate Barracuda II 500MB Ultra SCSI Hard Drive ST1917N	\$899.95
DS552 Seagate Barracuda II 500MB Ultra SCSI Hard Drive ST1917N	\$899.95

3Com PC Cards

Only \$129.95

3Com

- 3Com's Parallel Tasking Architecture
- Mfr's lifetime warranty
- Available in 5 & 20 packs

Iomega 1.0GB Jaz Drive

As low as \$499.95

Iomega

- Includes a 1.0GB Storage Cartridge with Jaz utility software!

Internal: # RDR4040
External SCSI (shown): # RDR11119
*Refurbished by the mfr. to meet original factory specifications. While supplies last.

Optiquest Q71 17" Monitor

Only \$389.95

OPTIQUEST.

Optiquest

- 17" screen (16" viewable)
- Maximum resolutions up to 1280 x 1024 @ 65Hz
- 28mm dot pitch • Plug-and-Play

Iomega 100MB Zip Drive

As low as \$139.95

Iomega

- Includes a 100MB disk with Zip Utility tool!

SCSI: # DR1050, only \$139.95
Parallel Port: # DR4802, only \$139.95
Zip Plus: # DR5279, only \$149.95
Zip Plus: # DR12274, only \$199.95

SYMANTEC.

Get Norton AntiVirus 4.0, Norton CrashGuard Deluxe, and Norton Uninstall Deluxe

Only \$79.95

SAVE OVER \$60!

*Shipped in promotional packaging. Offer expires 7/31/98 or while supplies last!
†Savings based on price of products sold separately.

MicroWAREHOUSE

The largest direct computer reseller in the US!

Call toll-free to order 24 hours a day, 7 days a week!

1-800-378-9081

Government and Education orders: 1-800-872-8699

Order Online @ www.warehouse.com

You can also FAX your order: 1-732-905-5254

Canada orders call: 1-800-730-4589

Choose 003 at www.pcmag.com/infolink

Order it today...Use it tomorrow!
EXPRESS DELIVERY OVERNIGHT!



New 24x Bantam, Now Reads CD-RW Disco!

A Handful Of Reasons To Buy The New Backpack® Bantam™ CD-ROM Drive.

[illegible]

It's the smallest, the fastest, and the best-looking, lightweight parallel port CD-ROM drive available—and it fits in the palm of your hand. It's the new backpack bantam CD-ROM

drive with integral Windows® stereo
sound. You'll tote it anywhere.

Everywhere. Installation is a breeze.

Everywhere. Installation is a breeze.

Simply plug this handy little drive into

the printer port of any IBM-compatible pc or note-

book. Use it with Windows (95, 3.X, NT®), DOS®.

and OS/2*. What about your printer? The

bantam has smart printer poss-

... ..

5. *For the first time, the U.S. has a*

LE ROY said that sleek package, but we did it



*Sound not supported under DOS, NT, or OS/2

backpack:

MicroSolutions



The port-ability leader.

Ph 800-293-1214 (US and Canada)
~ 815-254-3411 Fax 815-254-2028

Internet: www.micro-solutions.com

Choose 027 at www.pcmag.com/infolink

CDW 800.736.4239 • CompUSA Direct 800.614.4727 • Global Computer Supplies 800.845.6225 • Micro Warehouse 800.367.7080 • ~~Micro~~ Micro 800.813.9856 • PC Connection, Inc. 800.800.5656 • PC Zone - 800.258.2088 • USA Flex - 800.872.3539

A Great Review is Worth Repeating

Almost nothing influences buyers in the computer market as much as a great product review, particularly one in PC Magazine. That's because computer product buyers rely on these reviews to help them make informed purchase decisions. They know that our labs, writers and editors can be trusted to be thorough, fair and impartial in their testing and reporting. For a computer product marketer a great review is almost priceless.

Its Value Increases With Use
Reprints of your review are an invaluable sell-

[illegible]

ing tool for your product and an important image builder for your company. An objective, third party product evaluation will be read, and trusted, by far more people than any regular product literature, direct mail, press release or sales letter. Think of all the ways you can take advantage of reprints:

- ▶ Use them in sales proposals
- ▶ Hand them out at trade shows
- ▶ Send them to your mailing list
- ▶ Provide them to distributors
- ▶ Add them to a press release or a mailing to your stockholders.

And, if you customize your reprints — with a special cover, highlighting, an ad, sales office listings, etc. — the value increases even more.

Get the most value from your PC Magazine review. Call Ziff-Davis Reprints today at

800-825-4237.



WE ACCEPT PO'S
FROM QUALIFIED FIRMS

30 DAY
MONEY BACK
GUARANTEE

MEMORY

LIFETIME
WARRANTY

NOW ACCEPTING
ORDERS THROUGH EDI

HOT BOX SPECIALS

HP 4, 4M, 4ST, 4SIMX, with 4 Meg	\$19.00
HP DeskJet 1200C, with 4 Meg	19.00
HP DesignJet 600, 650C with 4 Meg	19.00
1x32-70 EDO 4 Meg	9.00
Compaq LITE 5000 Series, 16 Meg Kits (2-8 Meg)	39.00
1x9-70, 30 pin Simm	4.00
1x3-70, 30 pin Simm	3.00
1x8-70, 30 pin Simm	2.00
Ti Travelmate 5000 Series (Base) 8 Meg	19.00
Intel CPU Pentium Pro 200 (512K)	695.00

Hurry - Limited Quantities!

www.4LTrade.com

DIMMS (168 pin)

SDRAM - 66MHZ, 100MHZ, 10ns, Ons	PC-100	PC-100 ECC
3.3V 16Meg	50	50
3.3V 32Meg	100	100
3.3V 64Meg	200	200
3.3V 128Meg	400	400
3.3V 256Meg	800	800

3.3V ECC, 10ns	3.3V ECC, 10ns	3.3V ECC, 10ns	3.3V ECC, 10ns
16Meg	50	100	200
32Meg	100	200	400
64Meg	200	400	800
128Meg	400	800	1600
256Meg	800	1600	3200

72 PIN SIMMS (FPM, EDO)

10x32 64 meg EDO	10x32 64 meg EDO	10x32 64 meg EDO	10x32 64 meg EDO
100	100	100	100
200	200	200	200
400	400	400	400
800	800	800	800
1600	1600	1600	1600

SIMM MODULES

10x32 64 meg EDO	10x32 64 meg EDO	10x32 64 meg EDO	10x32 64 meg EDO
100	100	100	100
200	200	200	200
400	400	400	400
800	800	800	800
1600	1600	1600	1600

CACHE MEMORY

Individual D-RAM Chips	Individual D-RAM Chips	Individual D-RAM Chips	Individual D-RAM Chips
100	100	100	100
200	200	200	200
400	400	400	400
800	800	800	800
1600	1600	1600	1600

VIDEO MEMORY MODULES

2Meg 4Meg 8Meg 16Meg	2Meg 4Meg 8Meg 16Meg	2Meg 4Meg 8Meg 16Meg	2Meg 4Meg 8Meg 16Meg
100	100	100	100
200	200	200	200
400	400	400	400
800	800	800	800
1600	1600	1600	1600

GATEWAY MEMORY

2Meg 4Meg 8Meg 16Meg	2Meg 4Meg 8Meg 16Meg	2Meg 4Meg 8Meg 16Meg	2Meg 4Meg 8Meg 16Meg
100	100	100	100
200	200	200	200
400	400	400	400
800	800	800	800
1600	1600	1600	1600

NEC MEMORY

2Meg 4Meg 8Meg 16Meg	2Meg 4Meg 8Meg 16Meg	2Meg 4Meg 8Meg 16Meg	2Meg 4Meg 8Meg 16Meg
100	100	100	100
200	200	200	200
400	400	400	400
800	800	800	800
1600	1600	1600	1600

NEW EASY MEMORY

2Meg 4Meg 8Meg 16Meg	2Meg 4Meg 8Meg 16Meg	2Meg 4Meg 8Meg 16Meg	2Meg 4Meg 8Meg 16Meg
100	100	100	100
200	200	200	200
400	400	400	400
800	800	800	800
1600	1600	1600	1600

Check our website for memory prices on:

ACER, Cisco, DEC, Epson, SGI, Sun, Zenith

310-539-0019
FAX: 310-539-5844

SECURITY WILL
CALL WINDOW
NOW OPEN

CALL
TOLL FREE

1-800-433-3726
(US and Canada)

Prices & Availability
Subject to Change
Without Notice

Mon-Fri, 7:00 a.m. to 5:00 p.m. PST
Sat. 10:00 a.m. to 1:00 p.m. noon

www.4LTrade.com or E-mail: Sales@4LTrade.win.net

Choose 019 at www.pcmag.com/Infolink

ITEM	DESCRIPTION	PRICE	ITEM	DESCRIPTION	PRICE
1	2Meg 4Meg 8Meg 16Meg	100	1	2Meg 4Meg 8Meg 16Meg	100
2	2Meg 4Meg 8Meg 16Meg	100	2	2Meg 4Meg 8Meg 16Meg	100
3	2Meg 4Meg 8Meg 16Meg	100	3	2Meg 4Meg 8Meg 16Meg	100
4	2Meg 4Meg 8Meg 16Meg	100	4	2Meg 4Meg 8Meg 16Meg	100
5	2Meg 4Meg 8Meg 16Meg	100	5	2Meg 4Meg 8Meg 16Meg	100

NOTEBOOK & LAPTOP MEMORY

ITEM	DESCRIPTION	PRICE	ITEM	DESCRIPTION	PRICE
1	2Meg 4Meg 8Meg 16Meg	100	1	2Meg 4Meg 8Meg 16Meg	100
2	2Meg 4Meg 8Meg 16Meg	100	2	2Meg 4Meg 8Meg 16Meg	100
3	2Meg 4Meg 8Meg 16Meg	100	3	2Meg 4Meg 8Meg 16Meg	100
4	2Meg 4Meg 8Meg 16Meg	100	4	2Meg 4Meg 8Meg 16Meg	100
5	2Meg 4Meg 8Meg 16Meg	100	5	2Meg 4Meg 8Meg 16Meg	100

COMPACT MEMORY MODULES

ITEM	DESCRIPTION	PRICE	ITEM	DESCRIPTION	PRICE
1	2Meg 4Meg 8Meg 16Meg	100	1	2Meg 4Meg 8Meg 16Meg	100
2	2Meg 4Meg 8Meg 16Meg	100	2	2Meg 4Meg 8Meg 16Meg	100
3	2Meg 4Meg 8Meg 16Meg	100	3	2Meg 4Meg 8Meg 16Meg	100
4	2Meg 4Meg 8Meg 16Meg	100	4	2Meg 4Meg 8Meg 16Meg	100
5	2Meg 4Meg 8Meg 16Meg	100	5	2Meg 4Meg 8Meg 16Meg	100

COMPACT NOTEBOOK/LAPTOP MEMORY

ITEM	DESCRIPTION	PRICE	ITEM	DESCRIPTION	PRICE
1	2Meg 4Meg 8Meg 16Meg	100	1	2Meg 4Meg 8Meg 16Meg	100
2	2Meg 4Meg 8Meg 16Meg	100	2	2Meg 4Meg 8Meg 16Meg	100
3	2Meg 4Meg 8Meg 16Meg	100	3	2Meg 4Meg 8Meg 16Meg	100
4	2Meg 4Meg 8Meg 16Meg	100	4	2Meg 4Meg 8Meg 16Meg	100
5	2Meg 4Meg 8Meg 16Meg	100	5	2Meg 4Meg 8Meg 16Meg	100

DELL MEMORY

ITEM	DESCRIPTION	PRICE	ITEM	DESCRIPTION	PRICE
1	2Meg 4Meg 8Meg 16Meg	100	1	2Meg 4Meg 8Meg 16Meg	100
2	2Meg 4Meg 8Meg 16Meg	100	2	2Meg 4Meg 8Meg 16Meg	100
3	2Meg 4Meg 8Meg 16Meg	100	3	2Meg 4Meg 8Meg 16Meg	100
4	2Meg 4Meg 8Meg 16Meg	100	4	2Meg 4Meg 8Meg 16Meg	100
5	2Meg 4Meg 8Meg 16Meg	100	5	2Meg 4Meg 8Meg 16Meg	100

LASER PRINTER MEMORY UPGRADES

ITEM	DESCRIPTION	PRICE	ITEM	DESCRIPTION	PRICE
1	2Meg 4Meg 8Meg 16Meg	100	1	2Meg 4Meg 8Meg 16Meg	100
2	2Meg 4Meg 8Meg 16Meg	100	2	2Meg 4Meg 8Meg 16Meg	100
3	2Meg 4Meg 8Meg 16Meg	100	3	2Meg 4Meg 8Meg 16Meg	100
4	2Meg 4Meg 8Meg 16Meg	100	4	2Meg 4Meg 8Meg 16Meg	100
5	2Meg 4Meg 8Meg 16Meg	100	5	2Meg 4Meg 8Meg 16Meg	100

BATTERIES

★ OVER 1400 BATTERIES ON OUR WEBSITE ★
www.4LTrade.com - AC Adaptors & Chargers

TOSHIBA LAPTOP MEMORY

MODEL	DESCRIPTION	PRICE	MODEL	DESCRIPTION	PRICE
1	2Meg 4Meg 8Meg 16Meg	100	1	2Meg 4Meg 8Meg 16Meg	100
2	2Meg 4Meg 8Meg 16Meg	100	2	2Meg 4Meg 8Meg 16Meg	100
3	2Meg 4Meg 8Meg 16Meg	100	3	2Meg 4Meg 8Meg 16Meg	100
4	2Meg 4Meg 8Meg 16Meg	100	4	2Meg 4Meg 8Meg 16Meg	100
5	2Meg 4Meg 8Meg 16Meg	100	5	2Meg 4Meg 8Meg 16Meg	100

NOTEBOOK, LAPTOP MEMORY

MODEL	DESCRIPTION	PRICE	MODEL	DESCRIPTION	PRICE
1	2Meg 4Meg 8Meg 16Meg	100	1	2Meg 4Meg 8Meg 16Meg	100
2	2Meg 4Meg 8Meg 16Meg	100	2	2Meg 4Meg 8Meg 16Meg	100
3	2Meg 4Meg 8Meg 16Meg	100	3	2Meg 4Meg 8Meg 16Meg	100
4	2Meg 4Meg 8Meg 16Meg	100	4	2Meg 4Meg 8Meg 16Meg	100
5	2Meg 4Meg 8Meg 16Meg	100	5	2Meg 4Meg 8Meg 16Meg	100

PC CARDS (PCMCIA) VERSION 2.0

ITEM	DESCRIPTION	PRICE	ITEM	DESCRIPTION	PRICE
1	2Meg 4Meg 8Meg 16Meg	100	1	2Meg 4Meg 8Meg 16Meg	100
2	2Meg 4Meg 8Meg 16Meg	100	2	2Meg 4Meg 8Meg 16Meg	100
3	2Meg 4Meg 8Meg 16Meg	100	3	2Meg 4Meg 8Meg 16Meg	100
4	2Meg 4Meg 8Meg 16Meg	100	4	2Meg 4Meg 8Meg 16Meg	100
5	2Meg 4Meg 8Meg 16Meg	100	5	2Meg 4Meg 8Meg 16Meg	100

HARD DRIVES FOR LAPTOP & NOTEBOOK

ITEM	DESCRIPTION	PRICE	ITEM	DESCRIPTION	PRICE
1	2Meg 4Meg 8Meg 16Meg	100	1	2Meg 4Meg 8Meg 16Meg	100
2	2Meg 4Meg 8Meg 16Meg	100	2	2Meg 4Meg 8Meg 16Meg	100
3	2Meg 4Meg 8Meg 16Meg	100	3	2Meg 4Meg 8Meg 16Meg	100
4	2Meg 4Meg 8Meg 16Meg	100	4	2Meg 4Meg 8Meg 16Meg	100
5	2Meg 4Meg 8Meg 16Meg	100	5	2Meg 4Meg 8Meg 16Meg	100



22825 Lockness Avenue • Torrance, CA 90501

OVER 50,000 PRODUCTS COMPUSA DIRECT™ - PROVIDING SOLUTIONS

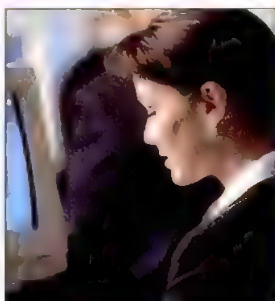
COMPUSA DIRECT



CompUSA Direct™ offers the service, selection, and support necessary to satisfy all of your computing needs. We offer more than 150 store locations nationwide for: hassle-free drop-off technical service, product returns and exchanges.

15 reasons to shop here. (period.)

- 1 More than 50,000 products
- 2 Superstore support
- 3 Guaranteed low pricing
- 4 Flexible payment plans
- 5 Same day shipping for second day delivery on in-stock items
- 6 Professional on-site installation available at reasonable prices
- 7 Free software installation with system purchase
- 8 Toll-free technical support for hardware and software
- 9 Hassle-free drop-off technical service at more than 150 CompUSA® Computer Superstore™ locations nationwide
- 10 Technology Assurance Program™ support/repair coverage
- 11 Computer and software training at CompUSA training facilities (See store for details)
- 12 Custom configuration
- 13 Knowledgeable, helpful service
- 14 On-site technical service available
- 15 Money-back satisfaction guaranteed (Call for details)



NO PAYMENTS • NO INTEREST FOR 6 MONTHS

Must be paid in full within 6 months from date of purchase. Minimum total purchase of \$299 is required. Offer valid until the next issue of this magazine. No Payments/No Interest Financing Details: subject to credit approval. Applies to qualifying purchases made with the CompUSA consumer credit card. Accrued finance charges will be assessed from the original date of purchase if balance is not paid in full within six months. As of February 25, 1998, the CompUSA credit card annual percentage rate (APR) is 22.30%. APR's vary; minimum monthly finance charge of 1% may apply. Credit is provided by Beneficial National Bank USA.

Offers Available Through Mail Order And The Internet Only.

COMPAQ



Presario 1220
• 200MHz MediaGX™
• MMX™ Enhanced Processor
• 12.1" High Performance Addressing Display (800x600 Resolution) • 32MB RAM
• 2.1GB HD • 20X CD-ROM
1999⁹⁵
Price Break -200⁰⁰
1799⁹⁵
203700-003

digital



Ultra 2000
• 166MHz Pentium™ Processor with MMX™ technology • 14.1" TFT Display (1024x768 Resolution)
• 32MB RAM • 3.0GB HD
• 20X CD-ROM
2599⁹⁵
FR-PF4WJ-AA

NOTEBOOKS

Compaq Presario 1215, 6X 180MMX™, 12.1 HPA
24MB, 1.6GB, 14X CD 203750-003 1499.95
Compaq Presario 1622, 233MHz™, 12.1 HPA,
32MB, 3.2GB, 20X CD 332240-003 2299.95

TOSHIBA

TECRA 750CDM
233MHz PROCESSOR
4879.95
PA1259U-T2C

Compaq Presario 1681, 233MHz™, 12.1 TFT,
48MB, 3.2GB, 20X CD 167330-003 2799.95
Digital VP703, 166MHz™, 13.3 ASTM,
16MB, 2GB FR-PJ7W1-AA 1799.95
Digital VP717, 200MHz™, 12.1 TFT,
32MB, 2GB, 20X CD FR-PJ6W1-AA 2499.95
Digital HiNote VP735, 233MHz™, 13.3 TFT,
32MB, 4GB, 20X CD FR-PJ4W1-AA 3199.95
Digital VP745, 266MHz™, 12.1 TFT,
32MB, 2.1GB, 20X CD FR-PJ5W1-AA 3499.95
Digital Ultra 2000, 266MHz™, 14.1 TFT,
32MB, 4GB, 24X CD FR-PF6W1-AA 4999.95
Digital Ultra2000, 233MHz™, 14.1 TFT,
32MB, 4GB, 24X CD FR-PF7W1-AA 4399.95
Fujitsu LifeBook S65TX, 166MHz™, 12.1 TFT,
32MB, 2.0GB, 20X CD FPC050142 2499.95
Fujitsu LifeBook 655TX, 150MHz™, 12.1 TFT,
16MB, 1.3GB FPC030032 1799.95
Fujitsu LifeBook 675TX, 200MHz™, 12.1 TFT,
32MB, 3.2GB, 20X CD FPC060012 3799.95
Fujitsu LifeBook 765DX, 166MHz™, 12.1 DS,
16MB, 2GB, 20X CD FPC070092 1499.95
Fujitsu LifeBook 985TX, 233MHz™, 13.3 TFT,
32MB, 5.0GB, 20X CD FPC090022 4499.95
Hitachi VisionBook 4360, 166MHz™, TFT,
16MB, 1.4GB, 10X CD 4360X-001 1899.95
Hitachi VB PlusS260, 166MHz™, 12.1 DS,
16MB, 2GB, 20X CD 5260-001 1699.95
Hitachi VP PlusS280, 233MHz™, 12.1 HPA,
32MB, 3.2GB, 20X CD 5280-001 2299.95
Hitachi VP 7580, 233MHz™, 13.3 TFT,
32MB, 3.2GB, 20X CD 7580-001 3799.95
Hitachi VP Pro7590, 266MHz™, 13.3 TFT,
48MB, 4GB, 20X CD 7590-001 4799.95
Hitachi Vision Elite 8565, 166MHz™, 13.3 TFT,
16MB, 2GB, 10X CD 8565-001 2999.95
IBM ThinkPad 770, 233MHz™, 13.3 TFT,
32MB, 4.0GB 954830U 4199.95
IBM ThinkPad 770, 200MHz™, 13.3 TFT,
32MB, 3.2GB 954840U 3699.95
IBM ThinkPad 770, 233MHz™, 14.1 TFT,
32MB, 5.1GB 95491AU 4999.95
IBM ThinkPad 380XD, 233MHz™, 12.1 FS,
32MB, 3GB, 24X MAX CD 26358AU 2499.95
IBM ThinkPad 380XD, 233MHz™, 12.1 TFT,
32MB, 4GB, 24X MAX CD 26359AU 3299.95

IBM ThinkPad 380XD, 266MHz™, 12.1 TFT,
32MB, 5GB, 24X MAX CD 2635AAU 4599.95
IBM ThinkPad 560E, 166MHz™, 12.1 TFT,
16MB, 2.1GB 264040U 2899.95
IBM ThinkPad 560X, 233MHz™, 12.1 TFT,
32MB, 4.0GB 264070U 3599.95
Toshiba Portege 300CT, 133MHz™, 10.4 TFT,
32MB, 1.6GB PA127U-T2A 1949.95
Toshiba Portege 320CDT, 266MHz™, 10.1 TFT,
32MB, 1.5GB PA1274U-T2A 3699.95
Toshiba SatPro 440CDT, 133MHz™, 12.1 TFT,
16MB, 1.4GB, 10X CD PA1241U-T2C 1099.95
Toshiba SatPro 445CDX, 133MHz™, 12.1 FS,
16MB, 1.4GB, 10X CD PA1241U-H6C 1399.95
Toshiba SatPro460CDX, 166MHz™, 12.1 FS,
32MB, 2.1GB, 20X CD PA1251U-H2C 1799.95
Toshiba SatPro470CDT, 200MHz™, 12.1 TFT,
32MB, 2.1GB, 10X CD PA1255U-T2C 2899.95
Toshiba SatPro480CDT, 233MHz™, 12.1 TFT,
32MB, 3.8GB, 10X CD PA1256U-T2C 3499.95
Toshiba Tecra520CDT, 166MHz™, 12.1 TFT,
32MB, 4.0GB, 10X CD PA1246U-T2A 3299.95
Toshiba Tecra530CDT, 166MHz™, 12.1 TFT,
32MB, 4.0GB, 10X CD PA1247U-T2A 3299.95
Toshiba Tecra550CDT, 266MHz™, 12.1 TFT,
32MB, 4GB, 20X CD PA1268U-T2A 3999.95
Toshiba Tecra730CDT, 150MHz™, 12.1 TFT,
16MB, 2GB, 10X CD PA1238U-T2C 2179.95
Toshiba Tecra740CDT, 166MHz™, 13.3 TFT,
16MB, 3GB, 10X CD PA1233U-T2C 2879.95
Toshiba Tecra750CDM, 233MHz™, 13.3 TFT,
32MB, 4.8GB, 20X CD PA1259U-T2C 4879.95
Toshiba Tecra750DVD, 233MHz™, 13.1 TFT,
64MB, 4.77GB, DVD PA1259U-T2D 5249.95

HANDHELD PCs/PDAs

3COM US Robotics PalmPilot Professional
Edition 1MB 80201U 299.95
HP 16MB 620LX Color PalmTop
Win-CE 2.0 F1250A 899.95
Psion Series5 8MB Palmtop 1900-0004 629.99

COMPAQ

PRESARIO 1622
233MHz PROCESSOR
2299.95
332240-003

Sharp 16mb Mobilon PDA Win CE
and Color Screen HC4500 999.95

COMPUTERS

Compaq Deskpro 2000,
200MHz™ Desktop 278800-002 979.95
Compaq Deskpro 4000H,
166MHz™ Desktop 308310-002 929.95
Compaq Deskpro 4000,
200MHz™ Desktop 270640-007 1249.95
Compaq Deskpro 4000,
233MHz™ Desktop 270760-005 1499.95

COMPUSA DIRECT

Toll Free

1-800-518-4480

OFFERS AVAILABLE THROUGH MAIL ORDER
AND THE INTERNET ONLY.
www.compusa.com

AT YOUR FINGERTIPS FOR YOUR COMPUTER NEEDS

OFFERS
AVAILABLE THROUGH
MAIL ORDER AND
INTERNET ONLY.

COMPAQ



HEWLETT
PACKARD
Expanding Possibilities

NEW LOW
PRICE!

3Com U.S. Robotics



1.99 ITS
Standard port
x2 Compatible

56K*/14.4 V90
Data/Fax Modem

Experience the Web, not the wait!
Grab web pages, e-mail, sounds,
games and video faster than ever before.

*56K modems are capable of downloads at 56Kbps,
but speeds in actual use may vary

99⁹⁵
80-005683-0

Deskpro 2000

- 166MHz Pentium® Processor with MMX™ technology • 32MB SDRAM • 3.2GB HD • 16X CD-ROM • Integrated 64-Bit Video

999⁹⁵

278750-002
Monitor sold separately

HP Pavilion 8240

- 233MHz Pentium® Processor with MMX™ technology
- 32MB SDRAM • 4.0GB HD • 24X CD-ROM • Integrated 64-Bit Video
- K56 Flex*/14.4 Data/Fax Modem

*56K modems are capable of downloads at 56Kbps,
but speeds in actual use may vary

999⁹⁵

D6404A#ABA
Monitor sold separately

Compaq Deskpro 2000, 200MHz Desktop	278800-004	1099.95
Compaq Deskpro 2000, 233MHz Desktop	280100-002	1369.95

COMPAQ
DESKPRO 4000N
166MHz PROCESSOR

929.95
308310-002
Monitor sold separately

Compaq Deskpro 4000S, 233MHz Desktop	288450-002	1249.95
Compaq Deskpro 4000, 233MHz Minitor	270700-003	1699.95
Compaq Deskpro 2000, 300MHz Minitor	278650-002	1999.95
Compaq Deskpro 4000, 266MHz Desktop	270680-003	1849.95
Compaq Presario 4540, AMD-K6™ 233MMX™ Multimedia Minitor	170650-004	999.95
Compaq Deskpro 2000, 233MHz Desktop	280100-005	1199.95
Compaq Deskpro 2000SBE, 266MHz Minitor	285500-402	2659.95
Compaq Deskpro 4000S, 200MHz Desktop	288330-002	999.95
Compaq Professional Workstation 5100, 300MHz	299300-003	4018.95

MONITORS

Compaq V50 15" multiple scan 13.7" Viewable Image Size	264150-001	299.95
Apple Multiple Scan 15AV 15", 13.75" Viewable Image Size	M46141L/A	399.95
Apple Multiple Scan 17", 16.1" Viewable Image Size	M61511L/A	649.95
CompUSA PC 14", 13.6" Viewable Image Size	14280-S	149.95
CompUSA PC 15", 13.8" Viewable Image Size	15280-S	199.95
CompUSA PC 17", 15.8" Viewable Image Size	17280-S	399.95
Digital 71P 17", 16.0" Viewable Image Size	FR-PCKAV-YZ	599.95
Digital 15", 13.8" Viewable Image Size	FR-PCKCV-DW	299.95
Digital 120P professional 21", 19" Viewable Image Size	FR-PCKAV-WZ	1399.95
IBM 670 17", 15.7" Viewable Image Size	6544403	689.95
IBM 651 15", 13.6" Viewable Image Size	654102N	279.95
KDS VS-7 17", 15.8" Viewable Image Size	VS-7	449.95
KDS VS-51 15", 13.8" Viewable Image Size	VS-51	249.95
NEC MultiSync M700 17", 15.6 Viewable Image Size	JC-1735VMA-1	689.95
NEC LCD2000 21", 21" Viewable Image Size LCD Panel	LA-2031JMW	6449.95

NEC E500 15", 13.8" Viewable Image Size	JC-1572VMA-1	379.95
NEC MultiSync A700 17", 15.6" Viewable Image Size	JC-1736VMA	539.95
NEC LCD400V 14.1" LCD Panel Display 14.1" Viewable Image Size	LA-1422JMW	1599.95
Nokia 447XAV, 17", 15.7" Viewable Image Size	447XAV	699.95
Philips Magnavox 107S 17", 15.9" Viewable Image Size	17C13A2E	429.95
Philips Magnavox 109S 19", 17.9" Viewable Image Size	19C5808E	799.95
Philips Magnavox 105S 15", 13.8" Viewable Image Size	15C3220W	199.95
Pixie Technologies 770 17", 15.8" Viewable Image Size	770	349.95
Pixie Technologies 570 15", 13.8" Viewable Image Size	570	249.95
Pixie Technologies 450 14", 13.25" Viewable Image Size	450-PIXIE	149.95
Sony CPD-100ES 15", 13.9" Viewable Image Size	CPD-100ES	319.95
Sony CPD-200ES, 17", 16" Viewable Image Size	CPD-200ES	649.95
ViewSonic G810 21", 20" Viewable Image Size	G810	1149.95
ViewSonic G773 17", 16" Viewable Image Size	G773	549.95

INKJET PRINTERS

Canon BubbleJet iJC-250	Q30-2250-US1	149.95
Epson Stylus 800 Color	C202011	349.95
Epson Stylus 600 Color	C200001	249.95
Epson Stylus 1520 Color	C211001	799.95
HP Deskjet 890Cse 9ppm	C5877A#ABA	399.95
HP Deskjet 694C	C4608A#ABA	239.95
HP Deskjet 670C	C5884A#ABA	199.95
HP Deskjet 722C	C5871A#ABA	299.95
NEC SuperScript 750C Color	750C	
179.95 - 30 Mfr. Mail-In Rebate		=149.95*
NEC SuperScript 150C	S5150C	
119.95-20 Mfr. Mail-In Rebate		=99.95*

LASER PRINTERS

Brother HL-1060, 1200dpi, 10 PPM	HL-1060	699.95
HP LaserJet 6Pse	C4212A#ABA	799.95
ViewSonic® 17" MONITOR (16.0" VIEWABLE IMAGE SIZE)		549.95 G773
HP LaserJet 4000N 17ppm	C4120A#ABA	1469.95
HP LaserJet 6Lse	C3994A#ABA	399.95
HP LaserJet 4000	C3094A#ABA	1149.95
HP LaserJet 5000	C4110A#ABA	1499.95
Minolta PageWorks 12	0994-301	899.95

NEC Technologies SuperScript 860	860	
399.95 - 50 Mfr. Mail-In Rebate		=349.95*

MULTIFUNCTION

Brother Color MultiFunction Center 7000, Print/ Copy/ScanFax	MFC-7000FC	
799.95 - 100 Mfr. Mail-In Rebate		=699.95*
Canon MultiPASS L6000 Laser Printer/ Fax/Copier/Scanner	H12-1052-US1	599.95

SCANNERS

HP ScanJet 6100Cse Professional Series	C6266A#ABA	799.95
HP ScanJet 5100Cse Flatbed	C5192A#ABA	299.95

MINOLTA
PAGEWORKS 20
LASER PRINTER

899.95
0993-301

Microtek ScanMaker V600 (Windows)	1108-03-370235	249.95
Microtek ScanMaker E3 Plus (Windows)	1108-03-340105	149.95
Storm EasyPhoto ImageWave Flatbed	7200-1.0	99.95
Umax Astra 610S Color Flatbed	SPKG-13406	149.95
Umax Astra 1220P Color Flatbed	SPKG-13410	199.95
Visioneer PaperPort 3100 Flatbed	P3-65001-W	149.95

SERVERS

Compaq ProLiant 2500 Server, Pentium® Pro 200, No Hot Swap	250980-001	3849.95
Compaq ProLiant 1600 Server, 266MHz, No Hard Drive	292930-001	3730.95
Compaq ProSignia 200, 233MHz Server	292980-001	1699.95

DIGITAL CAMERAS

Agfa ePhoto 1280 Power Zoom	EPHOTO1280	899.95
Epson PhotoPC 600 XGA	8062011	
699.95 - 200 Price Break		=499.95
Kodak DC210 Zoom	1648146	
899.95 - 100 Price Break		=799.95
Olympus D-320L, 1024 x 768 Resolution	225-070	
699.95 - 100 Price Break		=599.95
Olympus D-500L, 1024 x 768 Resolution	225-040	899.95
Olympus D-600L, 1.4 MegaPixel Resolution	225-050	1299.95
Sony MVC-FD7 Digital Movie Floppy Disc Camera	MVC-FD7	699.95
INPUT DEVICES		
Cross CrossPad	CP41001-01	399.95
Logitech MouseMan +	911413-0403	59.95

Logitech TrackMan Marble (Serial-PS/2)	904164-1100	79.95
Logitech TrackMan Marble FX	904257-0403	99.95
Microsoft Natural Keyboard Elite	286-00082	59.95
Microsoft Intellimouse, PS2 and Serial	673-00004	59.95
MASS STORAGE		
HP SureStore CD-Writer Plus 7200i Internal EIDE Interface	C4380A#ABA	449.95
HP SureStore CD-Writer Plus 7200i External Parallel Port	C4381A#ABA	549.95
IBM Deskstar 8.4GB EIDE Hard Disk Drive	01K1318	399.95
IBM Deskstar 5.64GB IDE Hard Disk Drive	01K1281	299.95
IBM Deskstar 5.42GB IDE Hard Disk Drive	01K1278	299.95
Maxtor 2.5GB Diamond Max EIDE Hard Drive	K0182500A	199.95
Maxtor 3.2GB Hard Drive UltraDMA33	K0183200A	199.95
Maxtor 3.5GB Diamond Max Ultra DMA Hard Drive	K0183500D	219.95
Maxtor 4.3GB Diamond Max Ultra DMA Hard Drive	K0184300D	229.95
Maxtor 5.1GB Diamond Max EIDE Hard Drive	K0185120A	229.95
Maxtor 5.2GB Diamond Max Ultra DMA Hard Drive	K0185200D	229.95
Maxtor 8.4GB Diamond Max Ultra DMA Hard Drive	K0188400D	349.95
Maxtor 11.5GB Diamond Max Ultra DMA Hard Drive	K0191150D	
479.95 - 30 Mfr. Mail-In Rebate		=449.95*

IBM
DEKSTAR 6.4GB
IDE HARD DRIVE

299.95
01K1281

Maxtor 6.4GB Diamond Max Ultra DMA Hard Drive	K0186400D	279.95
Memorex CRW-1622 Internal X26 CD-Rewritable Drive	3202-3190	299.95
Seagate 2.1GB Modelist Ultra DMA (ATA-3)	ST32122A	139.95
Seagate HardDrive 2.5GB, Int, Fast-ATA	ST52520AK	199.95
Seagate Modelist 1722 (Ultra ATA-3) 1.7GB Hard Drive	ST31722A	139.95
Seagate Modelist 4342 Ultra ATA-3 4.3GB Hard Drive	ST34342A	239.95
Syquest SparQ 1.0GB External Removable Cartridge Hard Drive	SPARQ1PE-01	199.95
Western Digital HardDrive, Int, 3.2GB, EIDE	3100RTL	209.95
Western Digital Caviar 5.1GB UltraDMA33 Hard Drive	5100RTL	259.95

Choose 198 at www.pcmag.com/infolink

9378-5-98

COMPUSA
DIRECT

Toll Free

1-800-518-4480

OFFERS AVAILABLE THROUGH MAIL ORDER
AND THE INTERNET ONLY.

www.compuser.com

SERVICE AND SELECTION

AVAILABLE 24-HOURS A DAY

www.compusera.com

OFFERS
AVAILABLE THROUGH
MAIL ORDER AND
INTERNET ONLY

HEWLETT
PACKARD
Expanding Possibilities

NEW!

HP DeskJet 1120Cse

- Up to 6.5ppm Black and Up to 4.5ppm Color • PhotoRE II Technology
- Prints Photo-Quality Color
- Versatile Printing Up to 13"x19"

499⁹⁵

C2679A#ABA

COLOR
PRINTER

OLYMPUS

D-320L Digital Camera

- 1024x768 Resolution • 2MB Removable Media Stores Up to 30 Images • 2" Color LCD Screen • Windows® and Mac® Compatible

PRICE
DROP!

699⁹⁵

Price
Break
-100⁰⁰

599⁹⁵

225-070

Com USRobotics

NEW!

Palm III

- Backlit Screen
- 2MB RAM
- Infrared Capabilities
- Includes Databook, Address Book, Memo Pad and More

399⁹⁵

80300U

UPS

APC Back-UPS Pro 420,
Plug n Play

BP420PWP 219.95

Maple

TL5GB
ULTRA DMA
HARD
DRIVE

Price Before
Rebate 479.95

Price After
Rebate 300.00

Price After
Rebate 449.95

K01911500

APC BACK UPS PRO BP650PWP 269.95

APC UPS/250VA Back-UPS, Office BF250 119.99

APC Pro Surge Arrest 8 Outlet with Phone and TV Protection PRO8TV 49.95

PK Electronics BlackOut Buster 500VA UPS B6U 149.95

MULTIMEDIA

Hi-Val 24X Portable PCMCIA

CD-ROM Drive HSLM24A-00R 349.95

Imagica Buzz Multimedia Producer 10604 189.95

MicroSolution's backpack bantam Parallel Port CD-ROM Drive 180100 229.95

Panasonic 20X Portable CD-ROM Drive (PCMCIA & SCSI) KXL-810A 399.95

Sony 32X Max CD-ROM Drive Upgrade Kit CDU711/CH 129.95

NETWORKING

3Com EtherLink III ISA 10BaseT

Only NIC (RJ-45) 3CS09B-TPO 59.95

Linksys EtherFast 100BaseTX LAN Card LNE100TX 34.95

Linksys Ether16 10BaseT LAN Card LNE2000T 24.95

NDC Communications SOHware 10/100 Fast Ethernet Adapter NET100TX-E 34.95

Netgear Fast Ethernet PCI Adapter FA310TX 36.95

SOFTWARE

Adobe Acrobat, V3.01, Win/Win95/WinNT, CD 22001137 199.95

AutoCAD LT 97 for Win on CD 057040148089000 429.95

Dragon Naturally Speaking Preferred for Win95 & NT on CD 010-348-101 169.95

Immaculate AntiVirus 1 User Client Pak on CD ILWS41-1 44.95

Intuit Quick Books Pro for Win & W95, V5, CD 74010 199.95

Microsoft Office 97 for W95 & WNT, CD Upgrade 021-00703 219.95

40 Mfr. Mail-In Upgrade Rebate 179.95

Microsoft Project 98 Upgrade for Win95 & NT on CD 076-00224 189.95

Norton AntiVirus 4.0 for DOS, Win, Win95, WinNT on CD-ROM 07-00-02128 49.95

10 Mfr. Mail-In Upgrade Rebate 39.95

Poachtree Accounting 5.0 for Win95/WinNT on CD PAWS0M 119.95

30 Mfr. Mail-In Upgrade Rebate 89.95

Quarterdeck Procomm Plus32 V4.5 for W95/NT/CD 90PCW45-0801US 129.99

Smart Suite 97 Value Pak Upd for Win95 on CD 098999 129.99

Symantec PC Anywhere 8.0 for Win95 & NT 07-00-02077 129.95

70 Mfr. Mail-In Upgrade Rebate 59.95

Symantec Norton Utilities 3.0 for Win95 on CD-ROM 07-00-02172 69.95

15 Mfr. Mail-In Upgrade Rebate 54.95

Symantec WinFaxPRO V8.0 for Win95/NT/CD 12-00-02503 89.95

Traveling Software LapLink for WinNT on CD & 3.5" FG-LINT00-RT-US 139.95

80 Mfr. Mail-In Upgrade Rebate 59.95

DC 210 ZOOM DIGITAL CAMERA 899.95

Price Before Rebate 1000.00

Price After Rebate 799.95

1648146

Vizio Pro 5.0 upgrade for Win95 on CD 119748 149.95

Symantec WinFaxPRO V8.0 for Win95/NT/CD 12-00-02503 89.95

PC CARDS

3Com EtherLink III LAN PC Card 10BaseT (RJ-45) 3CS89D-TP 99.95

3Com EtherLink III LAN+33.6/14.4 Data/Fax Modem PC Card 10BT (RJ-45) 3CS62D-TP 279.95

3Com Fast EtherLink XL CardBus PC Card 3CS75-TX 169.95

3Com Megahertz 10/100 LAN+56K/14.4 Data/Fax Modem PC Card 3CFEM556 379.95

3Com Megahertz 10Mbps LAN+56K/14.4 Data/Fax Modem PC Card w/XJACK 10BT 3CEM567 279.95

Intel EtherExpress PRO/100 LAN + Modem, SYMANTEC ACT! 4.0 WITH FREE ACT! PLUS PACK 169.95

Price Before Rebate 100.00

Price After Rebate 69.95

06-00-00652

16-Bit PC Card MBLA1656 349.95

Linksys Combo PCMCIA EthernetCard EC2T 69.95

Linksys EtherFast 10/100 PC Card PCMPC100 99.95

Megahertz 56K/14.4 Data/Fax PCMCIA Modem with XJACK XJ1560 219.95

Megahertz Modem, PCMCIA, 56K* Upgradeable, X2, XJACK, XJ1336 XJ1336 174.95

Megahertz 56Kbps Cellular-Capable PCMCIA Modem with XJACK XJ5560 219.95

Viking Components 56k PC-Card Modem, Type11 RFM56KP 139.95

Xircor CreditCard Ethernet Adapter 10/100-Ready CE38-100BTX 154.95

Xircor CreditCard Ethernet 10/100+Modem 56 with MiniDock CEM56-100MD 349.95

MODEMS

Best Data 33.6/14.4 Data/Fax Internal Modem for PC 336F 49.95

Diamond Internal 56K*/14.4 Data/Fax SupraMax Modem XPR561PCW95-XL1 69.95

Diamond 56K*/14.4 Data/Fax ITU Internal Speakerphone XPR561SPCC-XL1 119.95

Diamond Internal 56K*/14.4 Data/Fax SupraMax Modem XPR561PCW95-XL1 69.95

Diamond 56K*/14.4 Data/Fax ITU Internal Speakerphone XPR561SPCC-XL1 119.95

Eiger Labs 33.6/14.4 Data/Fax PCMCIA Modem EFX-3360PL 129.95

USRobotics Sport 56K*/14.4 Data/Fax ITU Internal Modem 80-005687-0 159.95

USRobotics Sport 56K*/14.4 Data/Fax ITU External Modem 80-005686-0 179.95

3Com/USRobotics 56K*/14.4 Data/Fax External ITU voice Modem 80-005605-0 239.95

3Com USRobotics 56K*/14.4 Data/Fax ITU Win Modem 80-005683-0 99.95

3Com USRobotics 56K*/14.4 Data/Fax Internal ITU Voice Modem 80-005685-0 219.95

Viking 33.6/14.4 Data/Fax PCMCIA Modem RFM336P 99.95

Viking Components 56K*/14.4 Data/Fax Int. High Speed Desktop Modem RFM56KUSPA 99.95

STORAGE

Imagica 100MB ZipPlus Drive 10660 199.95

Imagica Zip PC Multicolor 10-Pack 10533 129.99

KAO 25-pack Gold CD-Rom 10000012543 49.95

Maxell CD-R (CD-Recordable) (10 Pack/Box) 623390 29.95

Syquest SparQ 1.0GB PC Cartridge SPARQ-001 39.95

Syquest SparQ 1.0GB PC Cartridge (3-Pack) SPARQ-002 99.95

56K*/14.4 DATA/FAX V.90 MODEM 139.95

RFM56KPA

We'll beat any legitimate price in the current issue of this magazine on every product we sell. CompUSA Direct® prices are available through mail order and the Internet and are valid until the next issue of this magazine. Our low price guarantee pertains to new, factory sealed products of the same brand and model number that are available and in stock at any local authorized retail store. Our guarantee does not apply to competitors' one-of-a-kind or other limited-quantity offers, special financing, installation, manufacturer's rebate, or when a bonus or free offer is included in the purchase. Prices, specifications and services are subject to change without notice. We reserve the right to limit quantities. Any typographical, photographic, or production error in products, pricing or offers is subject to correction. Due to manufacturers' restrictions, certain products may not be eligible for international shipment, and certain products may not be available at retail stores. Monitor displays are simulated. The Intel Inside Logo and Pentium are registered trademarks and MMX is a trademark of Intel Corporation. Windows is a registered trademark of Microsoft in the U.S. and other countries. Packard Bell is a registered trademark of Packard Bell Electronics, Inc. IBM is a registered trademark and PowerPC, Aptiva and Total Image Video are trademarks of International Business Machines Corporation, used under license therefrom. All trademarks are the property of their respective companies. Items other than software, game cartridges and DVD movies, returned within ten (10) days from date of purchase with original receipt or invoice are eligible for refund or exchange. Unopened software, game cartridges and DVD movies may be returned within thirty (30) days from date of purchase with original receipt or invoice for refund or exchange. Opened software, game cartridges and DVD movies may be exchanged for exact item only within (30) days from date of original purchase with original receipt or invoice. CompUSA will not accept the return or exchange of any item if the UPC code has been removed from the packaging. A restocking fee equal to 15% of the purchase price will be charged on all returned items with missing boxes or packaging and returned printers with installed toner or inkjet cartridges. Refunds on cash purchases in excess of \$250 will be by check issued from CompUSA's corporate office within ten (10) business days of the return date. Refunds on purchases made with a credit card will only be credited to the same card. Postage required for mail-in rebate offers. *In Connecticut only, instant rather than mail-in rebate. Superstore Savings Direct To You, CompPrice, The Low Price Period and America's Largest Computer Superstore are service marks of CompUSA Management Company. CompUSA PC is a trade mark and CompUSA and CompUSA Direct are registered trademarks of CompUSA Management Company. ©1998 CompUSA Management Company. *Proof of ownership required for rebate. *56K modems are capable of downloads at 56Kbps, but speeds in actual use may vary. *Pentium® Processor with MMX® technology *Pentium® II processor featuring MMX® technology

COMPUSA
DIRECT

Toll Free

1-800-518-4480

Choose 199 at www.pcmag.com/InfoLink

OFFERS AVAILABLE THROUGH MAIL ORDER
AND THE INTERNET ONLY.
www.compusera.com

BIG DEAL TECHNOLOGY. GREAT DEAL PRICES.



Our selection of refurbished
desktops, notebooks and servers
changes daily, and
specific configurations
may be limited.
Call us today.

DELL DIMENSION® XPS D266 DESKTOP 266MHz PENTIUM® II PROCESSOR

• 64MB RAM • 8.4GB Hard Drive • 32X/14X Variable
CD-ROM • 4MB AGP Video • 56Kbps Modem*
* Upgrade to 2X DVD-ROM for \$200.

\$1549 MONITOR SOLD SEPARATELY

DELL® LATITUDE® LM M133ST NOTEBOOK 133MHz PENTIUM PROCESSOR WITH MMX™ TECHNOLOGY

• 40MB RAM • 2.1GB Hard Drive • 20X/9X Variable™
CD-ROM • 12.1" Active Matrix Display • Free 33.6Kbps
Modem • Upgrade to 72MB RAM for \$200.

\$1649

DELL INSPIRON™ 3000 M200ST NOTEBOOK 200MHz PENTIUM PROCESSOR WITH MMX TECHNOLOGY

• 32MB RAM • 2.1GB Hard Drive • 20X/9X Variable™
CD-ROM • 12.1" Active Matrix Display • Free 56Kbps
Modem* • Upgrade to 48MB RAM for \$100.

\$1999

DELL INSPIRON 3000 M233ST NOTEBOOK 233MHz PENTIUM PROCESSOR WITH MMX TECHNOLOGY

• 48MB RAM • 3.2GB Hard Drive • 20X/9X Variable™
CD-ROM • 13.3" Active Matrix Display • Free 56Kbps
Modem* • Upgrade to 80MB RAM for \$200.

\$2499

DELL DIMENSION XPS D300 DESKTOP 300MHz PENTIUM II PROCESSOR

• 64MB RAM • 8.4GB Hard Drive • 2X DVD-ROM
• 4MB AGP Video • 56Kbps Modem*
* Add a 100MB Zip Drive for \$80.

\$1849 MONITOR SOLD SEPARATELY

DELL LATITUDE LM M166ST NOTEBOOK 166MHz PENTIUM PROCESSOR WITH MMX TECHNOLOGY

• 40MB RAM • 2.1GB Hard Drive • 20X/9X Variable™
CD-ROM • 12.1" Active Matrix Display • Free 33.6Kbps
Modem • Upgrade to 72MB RAM for \$200.

\$1749

DELL INSPIRON 3000 M223ST NOTEBOOK 233MHz PENTIUM PROCESSOR WITH MMX TECHNOLOGY

• 32MB RAM • 2.1GB Hard Drive • 20X/9X Variable™
CD-ROM • 13.3" Active Matrix Display • Free 56Kbps
Modem* • Upgrade to 48MB RAM for \$100.

\$2299

DELL INSPIRON 3000 M266ST NOTEBOOK 266MHz PENTIUM PROCESSOR WITH MMX TECHNOLOGY

• 48MB RAM • 4GB Hard Drive • 20X/9X Variable™
CD-ROM • 13.3" Active Matrix Display • Free 56Kbps
Modem* • Upgrade to 80MB RAM for \$200.

\$2699

Welcome to the Dell Factory Outlet,
where you can purchase refurbished Dell
computers from anywhere in the U.S.A.

THE DFO ADVANTAGE:

- Finished goods ready to ship.
- DFO products are factory-certified to Dell's original specifications.
- You buy current technology and save money.

EVERY SYSTEM INCLUDES:

- Three-year same-as-new Limited Warranty.*
- Award-winning Dell 24-hour Technical Support.

VISIT OUR WEBSITE:

www.austin360.com/dell

- Look for the deal of the week.
- Stay on top of new values.

CALL NOW:

1-888-274-4672

- Mon-Fri 7am-9pm CDT
- Sat & Sun 10am-6pm CDT

Keycode 04721

SPECIALS (with system purchase)

Altec Lansing ACS-90 Speakers	\$29
Altec Lansing ACS-295 Speakers	\$79
15" (13.7" v.i.s.) Monitor (84766)	\$209
17" (15.7" v.i.s.) Monitor (84779)	\$329
Hewlett Packard DeskJet 722C Color Printer	\$299
Hewlett Packard LaserJet 6Lse Printer	\$429
Nylon Notebook Carrying Case	\$69
Latitude LM Secondary Battery	\$139
Inspiron 3000 Secondary Battery	\$169



All systems refurbished. Available configurations may vary. For a copy of limited warranties, please write to Dell Factory Outlet, 8801 Research Blvd., Austin, TX 78758. Attn: Warranties. All sales FOB Austin. Supplies limited to stock on hand. No rain checks. Prices and specifications subject to change without notice and valid in the U.S.A. only. *32X Max/4X Min. **20X Max/9X Min. **Capable of 56Kbps downloads. Due to FCC rules that restrict power output, current download speeds are limited to 53Kbps. Upload speeds are limited to 33.6Kbps. The Intel Inside logo and Pentium are registered trademarks and MMX is a trademark of Intel Corporation. Dell disclaims proprietary interest in the marks and names of others. Other trademarks and trade names may be used in this document to refer to either the entities claiming the marks and names or their products. Dell, the Dell logo, Dell Dimension and Latitude are registered trademarks and Inspiron is a trademark of Dell Computer Corporation. ©1998 Dell Computer Corporation. All rights reserved. Printed in the U.S.A. Reproduction in any manner whatsoever without the written permission of Dell Computer Corporation is strictly forbidden. Dell cannot be responsible for errors in typography or photography.

DELL
REFURBISHED

Win a Computer Today!

Extended service plan
ESP

NEW!
Supplements the manufacturer's warranty for a full 4 years from date of purchase!

Enter Online!

The
**PC Connection
Computer-A-Day
GIVEAWAY!**

CONTEST

Only!
\$898
54258

COMPAQ

Deskpro 4000s

- 166MHz Pentium MMX
- S3 Trio G4V2/GX Graphics
- 16MB SDRAM
- 2.1GB Hard Drive
- 256K L2 Cache
- Compaq 10/100TX Network Interface

Office 97
w/ Deskpro
200SBE
54495

54485 Deskpro 2000SBE \$1348

(200MMX 32MB 2.4GB 16X CD Office 97/FREE monitor)

54295 Deskpro 2000 1298

(PII 233.32MB 2.1GB Win95 FREE monitor)

Commitment to Excellence!

CTX EZ Book 760 MSP-XTI

- 166MHz Pentium MMX • 16MB Memory
- 16X CD-ROM Drive • 1.6GB Hard Drive
- Carrying Case
- 12.1" High Addressing Dual Scan Display

**FREE
Carrying
Case!**
53855

Accessories:

- 54163 Port Replicator for EZ-700 Series..... \$119
- 54125 16MB Upgrade Kit..... 74.95
- 54126 32MB Upgrade Kit..... 129.95
- 54316 Lithium Ion Battery..... 239
- 54594 NiMH Battery..... 119

Only! **\$999**

Best Deals on Hardware & Software!

Business		39116 Drive Copy	\$25.95	53743 Blaster DVD ROM	\$149.95	48248 UMAX Astra 610s	\$149
44992 FileMaker Pro 4.0 Upgrade	\$99	47305 Guard Dog	\$4.95	47517 Fire 1000 Pro (8MB-PCI)	\$179.95	40455 Visioneer PaperPort Strobe	229.99
46433 FrontPage 98	99.95*	35378 Norton Crash/AntiVirus/Uninstall	79.95	41702 Millennium 2 (8MB-PCI)	249.95	Storage	
49006 Goldmine 4.0	89.95*	48336 Norton Utilities W95	69.95	54554 Millennium II 8MB-APG	179.95	28749 3M/Imation TR-4 Travan Tape	36.95
46429 Microsoft Project 98	449.95	35300 Partition Magic 3.0	44.95*	51975 RR Studio (Mill 2)	219.95	25396 Fuji 10-pack CDR Media	8.50**
35515 Office 97 Professional Upg. CD	267.95*	Digital Cameras		CD-ROM/Media		**.85c/disk after rebate	
35507 Office 97 Standard Comp/Upg.	174.95*	52114 Vivitar Vivacam 3100	429.95*	44491 Buz Multimedia Producer	199.95	43688 TDK Labeled 50-pack CDR	99.95
50919 Office Sm. Business 2.0 Ed Upg	184.95*	47868 Casio QV-700	579	51418 Yamaha CRW 4260 Internal SCSI	599	44705 Iomega ZipPlus 100MB Drive	199.95
51345 Publisher 98	69.95*	46426 Kodak DC210Z	799	53363 Memorex 24x External	49.95*	19872 Iomega Zip disks 10-pack	129.95
47935 Universal Translator	69.95	47234 Olympus D-600L	1299	46417 Hi-Val Sountastic EIDI CDR	299	44385 Gig O'color Zip Disks	129.95
43775 Visio 5.0 Professional Upgrade	129.95	44855 Sony Mavica MVC-FD7	699	48570 Traxdata 2 x 6 Internal CDR Kit	379	47076 Jaz 2GB SCSI Internal Drive	549.95
46783 WordPerfect Suite 8 Upgrade	79.95	46954 Toshiba PDR-2	219.95*	53407 Smart & Friendly CD-SpeedWriter	399	47077 Jaz 2GB SCSI External Drive	649.95
Graphics & Design		Video Monitors & Cards		46296 Smart & Friendly CD-RW426 Deluxe	599	47079 Jaz 2GB 3-pack disks	449.95
40278 Adobe Illustrator 7.0	389.95	43320 Hitachi Elite 751 (19")	869	53405 Smart & Friendly CD-R8020	999	47080 Jaz 2GB Single Disk	169.95
32845 Adobe PageMaker 6.5	549.95	39387 Optquest Q71 (17")	399	Printers		47250 SyQuest SparQ - 1GB Drive	199
32920 Adobe Photoshop 4.0	549.95	48755 Sony 200ES 17"	629	44670 Canon BJC80 portable	299	47253 SyQuest SparQ - 3-pack cart	99.95
47186 Equilibrium DeBabelizer Pro 4.5	374.95	48756 Sony CPD-200GS (17")	699	37019 Epson Stylus Color 600	249	53366 Voodoo 2 PCI 12MB	299.95
51959 Extensis PowerSuite for Pshop	194.95	48750 Sony GDM-500PS (21")	1699	44246 HP Deskjet 722C	299	Networking	
53009 Micrograb Webtricity 2	189.95	48644 Viewsonic E771 17"	429	53513 HP LaserJet 5000	1499	43443 Addtron 10T NIC card	34.95
52407 NetObjects Fusion 3.0	294.95	31254 Viewsonic G810 21"	1099	49050 Lexmark Optra 1650s	999	29382 HP JetDirect EX	239.95
47737 QuarkXPress 4.0	698.95	31253 Viewsonic PB15 (21")	1299	Scanners		53384 100BT Dual Speed Hub 8 Port	219.95
Utilities		53216 ALL-IN-Wonder Pro (8MB-APG)	319.95	48704 Acer 310P	599	52953 USB V.90 56K Internal Modem	99.95
42874 Conversion Plus 4.0	94.95	36276 Diamond Pro 91TXM (21")	1199	49509 HP Scanjet 5100Cse	299	46118 56K 100B-T Eth.xprs. PCMCIA	249.95*
47758 Diskeeper 3.0	49.95			37216 Microtek ScanMaker III	1499	46399 OfficeConnect/SDN LAN Modem	279.95*

FREE!
CALL TODAY!

For your FREE
PC Connection
or MacConnection
catalog subscription!

(Mention Source Code 58PCM2) 800-986-2268



SUPER LOW SIMMS!

Memory
as low as
\$249
per MB

8MB as low as \$24.95
16MB as low as \$49.95
32MB as low as \$79.95
64MB as low as \$179.95



**Start
Saving!**

ask about...
**LEASING
OPTIONS**
for BUSINESS
CALL 800-800-0014

20,000 HOT PRODUCTS 24 HRS A DAY!

800-986-2268

www.pcconnection.com

Secure Shopping Online!

Choose 047 at www.pcmag.com/infotlink

PC AD 58PCM2

NETWORLD+INTEROP 98

**The Definitive
Networking Event**

**New ISP Forum,
Community,
Engineers
and General
Conferences**

**In-Depth
Educational
Tutorials &
Workshops**

**Over 600
Vendors
at the
Exhibition**

**Register by
March 25th
and Save**

Registration Info:

1-800-944-4629

**International
650-372-7090**

www.interop.com

THE WORLD OF TOMORROW IS HERE

LAS VEGAS, NEVADA • MAY 4-8, 1998



EXPERIENCE WHAT THE FUTURE HOLDS

In the world of tomorrow, people and machines will connect in new and seemingly unimaginable ways. You have an opportunity to see what the future holds May 4 - 8, 1998 in Las Vegas.

NetWorld+Interop is the definitive networking event bringing together over 600 of the world's leading technology vendors presenting products that are setting the standards for the 21st century. Workshops, conference sessions and tutorials conducted by celebrated industry leaders will provide you with a rare

face-to-face opportunity to learn from the visionaries who will define the standards for the years ahead.

The centerpiece of NetWorld+Interop is the InteropNet™—the world's largest short-term, real-time network. Networking masters collaborate to create a multi-layered, operational network that has more firepower than many small countries.

If the shape of the network, Internet, telecommunications and ISP future is important to you—this is the one event too important to miss!

EHMW8SPA

**I've Seen
The Future
NETWORLD
+INTEROP
98**

PC MARKETPLACE

I N D E X

PREMIER Shop NetBuyer Marketplace Go to www.netbuyer.com Click on Marketplace Hundreds of ads, plus links to the Web sites of NetBuyer Marketplace advertisers.

MORE INFORMATION AND LINKS JUST ONE URL AWAY — When you need more information to make your buying decisions than these ads provide, go to NetBuyer. Search a database of hundreds of ads by company, product and/or key words. Vendors can update their prices and product offerings daily. Plus, link to the web sites of advertisers for even more information. (Look for NetBuyer Marketplace under the ads in this section.) Bookmark www.netbuyer.com for more ads, more information and links to advertiser web sites.

HARDWARE

	PRIMER CLASSIFIED
Batteries	306
Boards/Components/Chips	294 306
Communications	294
Computer Systems	300 307
Input/Data Acquisition/Barcode/POS	298 308
Maintenance & Cleaning	295
Mass Storage Devices	296
Multi-Media	
Networking	296 308
Peripherals	296 306
Security	308
Video	293

SOFTWARE

	PRIMER CLASSIFIED
Business Applications	302 311
Business Utilities	303 311
CD-ROM Titles	
Communications	
Education	302 309
Entertainment/Games	
Financial/Accounting	311
General	309
Graphics/Design/CAD	300
Internet Tools/Utilities	314
Multi-Media	
Network Management	300

Religion	
Scientific/Engineering	
Security	311
Shareware/Public Domain	304
Adult	315

SERVICES

	PRIMER CLASSIFIED
Data Conversion/Data Recovery	312
On-Line	304
Software Duplication	313

MISCELLANEOUS

	PRIMER CLASSIFIED
Supplies	312

MARKETPLACE SALES 800-825-4237

◆ Andrea Sachs ◆ Patricia Neyer ◆ Lisala Beatty ◆ Jackie O'Hare ◆ Craig Katz ◆ Joan Burke ◆
Midwest x4579 Northeast x3620 Southwest x5132 Southeast x5138 NW & N. CA x5150 Sales Manager x5965

The World's #1 Rated Desktop Videoconferencing Kit

USB
UNIVERSAL SERIAL BUS

**Screamin' Fast
Video Camera!**



With Patented



Graded A+! Remarkable product! 30+fps!
Fantastic performance! - CTI Magazine



**Xirlink XVP500 Video Phone
Own it!**

- Easily connects to your USB Port. No video capture card needed
- Captures and sends high-resolution still images and real-time video
- Communicate over the Internet or standard phone line
- Includes video e-mail software program
- Xirlink Video Phone Suite includes over \$200 worth of award-winning software programs to make your camera come to life*

The XVP500 is available at:



1-800-258-2088
SKU# 58451



1-800-521-5454

Or call your
local reseller

Resell it!

- Offers great competitive advantage
- Great product for Windows 98 launch
- Includes the hottest software on the market
- Custom colors and company logo available

\$169
MSRP

Xirlink's Value Added Reseller's Program offers fantastic margins and benefits. For complete details please call (408) 324-2100 ext. 450.

Xirlink
YOUR MULTIMEDIA LINK

* Xirlink Video Suite includes: Xirlink H.324, Microsoft NetMeeting, MGI Videowave, Metacore's SOAP and GOO, ArcSoft's PhotoFantasy and Reality Fusion's Live Screen Saver

the Chip Merchant, Inc.
 888 WE DO RAM
 4870 Viewridge Avenue, San Diego, CA 92123
Lifetime Warranty

Desktop Memory

	x36 Parity	x32 Non-Parity	x32 EDO
16MB	\$35	\$27	\$26
32MB	\$65	\$56	\$51
64MB	\$158	\$170	\$140

SO DIMMs	PC SDRAM
3.3V EDO	32MB \$53
8MB	64MB \$132
16MB	128MB \$265

EDO DIMMs	EDO ECC
Non Buffered	Buffered DIMMs
x64 3.3V	x72 3.3V
32MB \$63	32MB \$76
64MB \$127	64MB \$152
	128MB \$320

Laptop Memory

Complete line of upgrades for most major brands.

For example...

Toshiba	T-400
32MB	\$90
64MB	\$155

Sony Vaio	
32MB	\$88
64MB	\$170

Fujitsu	
32MB	\$82
64MB	\$167

Compaq	
32MB	\$88
64MB	\$166

Prices may vary on certain laptop models

INTEL

Pentium® II 266MHz	\$387
Pentium® II 300MHz	\$551
Pentium® II 333MHz	\$625

AMD

AMD-K6-233	\$150
AMD-K6-233 BOX	\$167
AMD-K6-266	Call

www.thechipmerchant.com

Phone Hours: Mon - Fri: 7 - 5:45 Sat: 9 - 3:45

CPUs warranties vary. Prices subject to change without notice. Brand names are registered trademarks of their respective owners.

NetBuyer Marketplace

CHEAP SOFTWARE

TOLL FREE (888) 999-2611
www.cheapsoftware.net

Microsoft Office Pro 97 Single User License \$249
 Microsoft Office Professional 97 CD Only \$249
 Microsoft WINDOWS OSR 2.5 CD/Manual/Boot \$249
 MS Super Bundle CD-SUPER Deal!!! \$349
 MS Office Pro 97 Encarta 98. Cinema 4D 3.0 Move \$349
 Lotus SmartSuite 97 CD OEM \$249
 Macromedia Freehand Studio v.7.0 \$249
 MS Small Business Server 10 User Package: includes NT, Backoffice, Exchange, SQL & More \$149
 MS Windows NT Client 4.0 20 Client License Pack \$89

100+ Money Back Guarantee

DEALER INQUIRIES WELCOME

VISA MC AMEX Discover Corporate POs & CODs WELCOME

Softman Products Co.
 3620 Wade Blvd., Los Angeles, CA 90066
Prices subject to change without notice. All trademarks are property of their respective owners. Call for pricing on products not listed.

NetBuyer Marketplace or InfoLink 752

COMPUTER AMERICA

We'll Beat Any Advertised Price
CALL NOW - 800-769-4687

MEMORY	HARD DRIVES	MOTHERBOARDS
EDO	W DIGITAL	Asus P2L97 440LX w/AGP \$139
2X32 8MB \$12	1.2 \$109	Tyan Taha PII MB Intel 440FX support 233-300 \$169
4X32 16MB \$19	2.5 \$119	Intel Atlanta PII MB 440LX 233-300 ATX \$179
8X32 32MB \$38	3.2 \$149	
SD RAM	4.0 \$159	
2X64 16MB \$25	5.0 \$189	
4X64 32MB \$41	6.0 \$199	
8X64 64MB \$99	MAXTOR	
16X64 128MB \$219	1.0 \$109	
	2.5 \$119	
CD ROMS	4.0 \$169	
24X \$49 & OTHERS	5.1 \$189	
	7.0 \$279	
	8.4 \$339	
INTEL PENTIUM	FUJITSU	
P-150 \$69	1.2 \$89	
P-166 \$79	2.6 \$119	
P-166MMX \$91	3.5 \$139	
P-200 \$129	4.3 \$159	
P-200MMX \$113	5.2 \$199	
P-233MMX \$139	SAHMSUNG U-DMA	
INTEL PENTIUM II	PII-233 \$219	
PII-233 \$219	PII-266 \$269	
PII-266 \$269	PII-300 \$459	
PII-300 \$459		

VIDEO CARDS

ATI 3D Expression PC 2TV	2MB \$59
ATI 3D Expression PC 2TV	4MB \$89
ATI 3DPro Turbo PC 2TV	4MB \$109
Matrox Millennium	4MB \$129
Matrox Millennium	8MB \$189
Mystique 230	4MB \$115
Diamond 3D VRAM	3MB \$99
Diamond 3D VRAM	4MB \$139

VALUES AND COSTS ARE IN U.S. DOLLARS. NO RESALE. Prices are subject to change without notice.

www.memorybuyback.com

Magic Memory™

NetBuyer Marketplace or InfoLink 753

Breakthrough

In Keyboard Monitor Switches

Multi Platform & On-Screen Display

BREAKTHROUGH the clutter of multiple keyboards, monitors, and mice with this latest **INNOVATION** from Rose. This switch has every feature you asked for.

Switches several servers or computers to a single monitor, keyboard, and mouse.

Supports any mix of PC, Apple, Sun, RS 6000, HP 700 series, DEC Alpha, SGI, or other computers from any keyboard or mouse.

Front panel has keypad for easy selection of computers and configuration.

Front panel display shows computers name and other information.

Command to switch can come from keyboard, front panel, or RS232 port.

Simple to use keystrokes switch computers for fast and easy control.

Built in daisy-chaining supports up to 256 computers.

Flash memory for future upgrade of features.

Easy to use **OverView™** system gives control and status with on-screen graphics.

Many other features!

CALL FOR A FREE CATALOG:

- Keyboard/Video Control
- Print Servers
- Data Switches

800-333-9343

VISIT OUR WEB SITE AT **WWW.ROSEL.COM**

ROSE ELECTRONICS

10707 STANCLIFF ROAD HOUSTON, TEXAS 77099 TEL 281-933-7673 FAX 281-933-0044

VISUAL QUOTES

The Smartest Way to Generate & Manage Sales Proposals

VISUAL QUOTES FOR WIN95 & WIN 3.X FEATURES:

- Duplicate Quotes
- Protect Quotes with Revision Control
- Optional Automatic Quote Numbering
- Multiple Report Formats
- Import & Export from multiple industry standard formats
- Compatible with ACT 2.0, ACT 3.0, Goldmine 3.0 and Crystal Reports 5.0
- Internet site with free report formats

Visit our Web Site at **http://www.vquotes.com**

Visual Quotes PE (Personal Edition)

1-787-752-3611

Visual Quotes is a trademark of AISS. All other brands and names are trademarks of their respective owners.

NetBuyer Marketplace or InfoLink 754

50+ motherboards

New Motherboard Comparison Tables!

award-winning systems & peripherals

hundreds of detailed specifications

24 hours a day, 7 days a week one web site

www.aberdeeninc.com/mag

888-453-0707

ABERDEEN

mag80326

NetBuyer Marketplace or InfoLink 755

Not Just Another Pretty Face

Starting at only
\$169

Control up to 4 computers using one keyboard, monitor and mouse with SwitchView! At only 8 inches across, this sleek, compact unit takes up less room on crowded desktops. Combine that with the economical price and SwitchView is quite an attractive package!

But don't be fooled . . . there are brains behind this beauty.

Built-in mouse translation lets you use a PS/2 or IntelliMouse to control any attached PC - serial or PS/2 style. Keyboard or front panel push-button switching, automated scanning and industry standard cables make the SwitchView easy to use too! Two and four port models are available.

Not your usual lightweight. For more information on this exciting new KVM switch, contact us today.

**See us at PC Expo, June 16-18
New York, NY, Booth #4754**

Cybox, the Cybox Logo and SwitchView are trademarks or registered trademarks of Cybox Computer Products Corporation. IntelliMouse is a registered trademark of Microsoft Corporation.



"SwitchView from Cybox Computer Products offers an affordable and reliable solution to the space headaches that multiple computers cause."

-Internet Computing

Cybox Computer Products Corporation
4912 Research Drive • Huntsville, AL 35805
(800) 932-9239 • (561) 430-4030 fax
<http://www.cybox.com>



3D PixelView 3D Combo TV ISO 9002 Certified

Labels on the board: 125 Channel TV Tuner, FM Antenna, TV Antenna, Video-In, Audio-In, VGA-Out, DTV-Camera, S-Video-In, For FM Audio-Out, BIOS, Cirrus Logic CL-PX4072 Decoder Chip, Feature Connector, Connector for MTS/Teletext Module, 64 Bit Cirrus Logic CL-GD5465 VGA Chip, 4MB SDRAM.

- Resolution up to 1600 x 1200, 64K Colors (4MB)
- Support NTSC/PAL/SECAM Standard
- ➔ Various Functions:
 - Watch TV or LD, VCR, CAM
 - Listen to FM Radio
 - MPEG Movie Playback
 - Play 3D Games or 3D Programs
 - Video Conferencing with Optional CAM



PROLINK COMPUTER INC. (USA)
Tel: 626 369 3833 800 686 6110 Fax 626 369 4883
email: sales@prolink-usa.com

Website: <http://www.prolink-usa.com>

PixelView Meeting PAK



Video Conferencing over internet or point to point at any existing PC

- PCI 2.1 Compliance with Plug & Play Capabilities

THE MILLENNIUM IS ALMOST HERE... WILL YOU GET CAUGHT WITH YOUR PANTS DOWN?

800-800-BIOS 2467

UNICORE FAX: 978-683-1630 TEL: 978-685-6468 Email Orders at <http://www.unicore.com>

ORDER NOW!

NetBuyer Marketplace

Will All Be Corrupted Unless You Audit The Year 2000 Problem Now!

GET THE MILLENNIUM/PRO NOW! - AND SAVE YOUR PC

FEATURES:

- FULL Y2K BIOS COMPLIANT
- UNIVERSAL
- SAVES TIME/MONEY
- WORKS ON ALL PCs
- EZ INSTALL

CLEAN COMPUTER MICE FAST

Kit Includes:

- Cleaning pad
- Cleaning solution
- Cleaning ball

Computer mice always get dirty - the mouse arrow or pointer skips & jumps. Don't trash it! Clean it!

- TidyMouse extends the life of your mouse!
- TidyMouse cleans in under 2 minutes!
- TidyMouse is very easy to use!

ORDER TODAY! only \$19.95 plus S&H
888-829-1131
Fax: 330-923-6620
www.tidymouse.com

Patent Pending
TIDY MOUSE

Mintec, Inc.
P.O. Box 1657
Akron, Ohio 44306-1657

DOS • WINDOWS • OS/2 • NT • OS/386 • UNIX

CHI Corporation
30275 Bainbridge Rd, Suite 2A
Solon, OH 44139 • 800-828-0599
(440)349-8605 • Fax (440)349-8609

Corporate East Coast Sales

Southwest Sales—Chi Corporation
4007 Dream Catcher Dr.
Woodstock, GA 30189
(770)517-0636 • 800-564-3634

West Coast Sales—Chi Corporation
10840 North 28th Dr., Bldg. C205 Suite 21
Phoenix, AZ 85029
(602)548-9010 • 800-928-9099

Data Interchange & Storage Expert

Nine Track Tape Systems
All Densities—800/1600/3200/6250
All Platforms

3480/3490/3490E/3590
compatible
Single Load or 10 or 60
cartridge Libraries

AIT-DLT-4mm-8mm
Complete Network backup
Solutions—Novell, NT, Unix
Libraries by ADIC & Overland Data

Data Conversion Services

4mm, 8mm, 9trk, 3480, 3490,
3490E, EVEN TO CD

CD ROM Recorders
2x/6x, 4x/6x—All platforms
Media Form CD duplication systems

CD ROM Jukeboxes
NSM, SONY, JVC, Pioneer, Cygnit

CHI 1635
35 CD capacity with 7-16x
CD ROM Readers

Chi Corporation: Manufacturers of the
Award Winning OutRight and ReelView II Software

Overland Data DLT Tape Libraries

Great capacity at lower cost



With native capacities from
300 GB to 525 GB, The LXS
MiniLibrary delivers a cost-
effective solution for workgroup-
to-enterprise data storage.

The LXS accommodates one DLT 4000 or 7000 tape drive
and 15 DLT tape cartridges.

www.chi corporation.com

NetBuyer Marketplace or InfoLink 756

Did you get your?



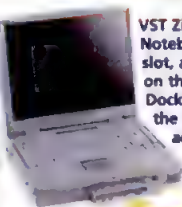
Available Now!
VST Zip™ 100 Drive
for your IBM ThinkPad™

- Runs in the UltraBay™
- Compatible with models:
755CD, 755CDV, 760CD, 760E
(thick), 760ED, 760EL, 760ELD,
760LD, 760XD, 760XL, 765D,
765L (770 Series coming soon)
- Uses Standard 100MB Zip disks



IBM
THINKPAD

Coming Soon...



VST Zip Drive for the NEC® Versa®
Notebooks with VersaBay™ II
slot, also fits into the VersaBay
on the MiniDock 6000 or
Docking Station 6000+ with
the VersaBay II
adapter kit.

Also Available



VST Zip
Drive for
Apple PowerBooks®
G3, 3400, 1400
and 190/5300 Series.



VST Zip Drive
also for the IBM
ThinkPad 770 Series.



The Portable Solutions Specialists

125 Nagog Park • Acton, Massachusetts 01720
(978) 263-9700 • Fax (978) 263-9876 • <http://www.vsttech.com>

©1998 VST Technology, Inc. All rights reserved. VST and the VST logo are trademarks of VST Technology, Inc. All other trademarks are property of their respective owners. VST and the VST logo are registered trademarks of VST Technology, Inc. All other trademarks are property of their respective owners.

NetBuyer Marketplace

TAPE DRIVES

Read/Write Mainframe Tapes on PCs



9-Track



Libraries

3480/3490/3490E

QUALSTAR®

800-468-0820
Web: www.qualstar.com
E-mail: sales@qualstar.com

FAX: (818) 592-0116
TEL: (818) 592-0061

TAPE LIBRARIES

Automate Backup

All trademarks are the property of their respective owners.

SYSTEM LOCKED! WE'VE GOT THE KEY!

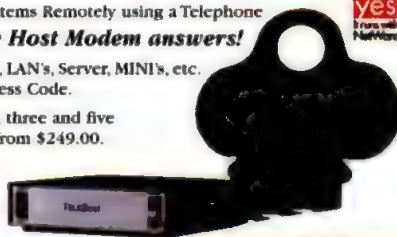
Unlock "Locked-Up" CPU's remotely with TeleBoot®

Now you can Reboot Systems Remotely using a Telephone
or Modem, *even if the Host Modem answers!*

TeleBoot® works on PC's, LAN's, Server, MINI's, etc.
and offers a Security Access Code.

The units are available in three and five
outlet versions. Starting from \$249.00.

TeleBoot® is your **KEY**
to minimizing
System Downtime.



U.S.A. Communications Corp.
493-9 Johnson Ave, Bohemia, NY 11716
516-244-6851 Fax 516-244-5725

www.usacomcommunications.com
CALL TODAY TOLL FREE
800-724-5434

STOP Production Dust From Getting Into Your Computer Equipment



DS 850—CPU, Monitor & Keyboard

The **DUSTSHIELD** is used by hundreds of
companies to prevent the damage and downtime
that occurs when airborne contaminants get into
computer equipment

The **DUSTSHIELD** utilizes a unique two stage
fan filter system to create an ultra clean positive
pressure environment

DUSTSHIELDS are easy, effective and affordable.
Access to Drives, etc is unhampered. Custom
Made for CPUs, Monitors, Servers, Workstations
Laser Printers and many others

ENVIROSAFE TECHNOLOGIES

888-844-5574

Jax, FL • Fax 904-646-3575
WebSite: <http://www.dustshield.com>

NetBuyer Marketplace

Wireless Printer Sharing

Easy
Do it yourself, plug and print ready.
Install in minutes.

Flexible
Place up to 8 printers and 64 PCs or
laptops anywhere up to a 500 ft. radius.

Fast
Prints up to 5 times faster than network
or wired printer sharing.

Compatible
Works with any IBM Compatible
PCs, printers and parallel ports.

"PC Magazine
Top 100
Accessories
of 1997"

as low as
\$99
per unit

800-492-2320



Go Print

NetBuyer Marketplace or InfoLink 757

WHEN IT COMES TO VPN, THE INTRAPORT™ VPN ACCESS SERVER MEANS INSTANT R.O.I.



"The IntraPort™ server's low cost and relative simplicity make it particularly attractive." Network World, Jan. '98



"In contrast to VPN products from Ascend, Bay, Checkpoint, Cisco, Shiva and TIS...the IntraPort™ is a stand-alone device. The combination of its price, features, throughput, and connectivity make it an ideal choice for small enterprises." Internet World, Feb. '98

- IPSec, packet by packet authentication, 56 bit DES
- Supports IP and IPX
- Unparalleled ease of use
- Eliminates leased line and long distance charges
- Decreases network administration while increasing security

Call or visit our website today for your **FREE VPN** handbook.

888/356-0283

www.compatible.com/vpn_now/



Compatible Systems

the virtual leader

NetBuyer Marketplace

Introducing MasterConsole II

The KVM switch that does everything but make the coffee!

Brains. Brawn. Beauty. This KVM switch has it all. Control for 4, 8, 16, up to 256 computers – PC, Mac, Sun, and others. On-screen user interface. Hi-res video. Password security. And a dedicated processor per channel for automatic computer booting and flawless operation.

As for the coffee, we'll take care of that when you call to learn more.



Have a FREE cup on us!

Receive a coupon good for a FREE cup of Dunkin' Donuts® coffee and choice of a donut, muffin, or bagel. Just mention Code 50 when requesting MasterConsole II information.

Call toll free
1-800-724-8090, X50.
Or visit us online at
www.raritan.com

Get a hands-on demo at:
Comdex, Chicago, April 20-23, Booth #8727
N+I, Las Vegas, May 5-7, Booth #1524

Raritan

E-mail: sales@raritan.com Phone: 732-764-8886 Fax: 732-764-8887

KILLER RAID KILLER PRICES!

Dynamic 1-800-714-SCSI
www.dynamicdisk.com

Price • Support • Performance

Memory • Disk • Tape • RAID • NT • UNIX
Compaq • SGI • SUN • DEC • HP • RS/6000

COMPUTER RACKS & ENCLOSURES

HERCO

888-222-7270

NetBuyer Marketplace or InfoLink 750

INCRECIBLE VALUE

From The
PROJECTOR
PEOPLE!



All projectors include
FREE 2 Year Warranty
and **FREE Dual Beam
Laser Pointer!**

**30 DAY
MONEY BACK
GUARANTEE**
WE WILL
MATCH ANY
PRICE!

*Limitations
may apply

NEW!
The Brightest
XGA/SVGA!

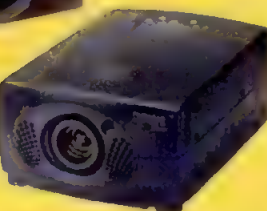


EPSON POWERLITE 7000XB
XGA (1024 x 768) projector • Workstation
compatible (1280 x 1024) • 14 lbs. • 650 lumens

For True SVGA (800 x 600) order the NEW
EPSON POWERLITE 5000XB
Incredible 750 lumens

Call for Best Price

**Spring
Blowout!**



PROXIMA DP9200
XGA (1024 X 768) projector
550 lumens • 14 lbs.
CALL FOR BEST PRICE

For True SVGA (800 x 600)
order the DP5900!
700 lumens • 14 lbs.
CALL FOR BEST PRICE

CTX PROJECTORS

9 lbs! • Executive carry case included
VGA model 500 SVGA model 550

\$2495 \$2959

Ask about our
"gently used"
demo specials!

**Audio Visual
Innovations**

Your Source For Being Seen And Heard.

Call Toll FREE **800-475-1986** Mon-Fri 8 am-8 pm EST. or online at **www.aviinc.com**

NOW RENTING.
True 800 x 800 Resolution!

**Great
Image
For Rent**



Whether you need lightweight portability,
high-resolution, incredible brightness
or multimedia, we've got the right
tools to make your bright ideas shine!

- ▶ Your rental fee applies towards the purchase of any system within 30 days
- ▶ Guaranteed 24-hour service
- ▶ Every system is tested for Guaranteed Performance!



<http://www.boxlight.com>

BOXLIGHT
Presenting a better way

Look Bright Overnight! Call:

1-800-736-6954

Digital Camera Card Readers

PC Card Connectivity Solutions for
ALL Leading Digital Cameras
Windows 95/NT, Mac, Unix



SCSI PC Card Reader/Writers

- Use with Win95/3.x, DOS, Mac and Unix
- ATA flash, hard disks, SRAM, SmartMedia and CompactFlash cards

Parallel Port PC Card Reader/Writers

- Use with Win95: ATA flash, SmartMedia and CompactFlash card readers

USB Port PC Card Reader/Writers

- Use with Win95: ATA flash, SmartMedia and CompactFlash card readers

**The Leader in
PC Card
Connectivity**

**Intermart
Systems**

Call our toll free number for reader
and distributor information.



NetBuyer Marketplace

131-D Albright Way
Los Gatos, CA 95032
toll free: 1-800-451-1571
tel: (408) 379-0770
fax: (408) 379-3666
<http://www.intermarisys.com>

**ONE LINK TO
HUNDREDS OF
VENDORS**

Go to www.netbuyer.com and click on marketplace.

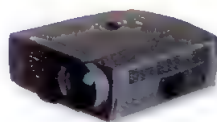
NetBuyer

Marketplace

BOXLIGHT'S STAFF
HAS THE TRAINING
EXPERIENCE AND
KNOWLEDGE TO
EAGERLY GUIDE YOU
INTO THE LIGHT

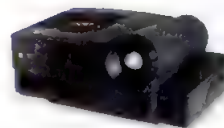
PROJECTORS AREN'T NECESSARILY THE BRIGHTEST COMMODITY WE OFFER YOU.

- Selling and renting presentation equipment is our only business.
- We've also been selling electronic presentation equipment longer than anyone else.
- All of BOXLIGHT's sales consultants undergo a rigorous, 15-week training regimen.
- Every one of our consultants is trained "hands-on" with every BOXLIGHT product.
- The result: if you want help making an informed buying decision, no one is more uniquely qualified than your BOXLIGHT sales consultant.



BOXLIGHT 4000 NEW LOWER PRICES CALL

- The ultra-light, road-ready "laptop" of DLP™ projectors—only 6.9 lbs.
- 500+ ANSI lumens—bright enough for lights-on presentations



BOXLIGHT 2025 PRICES ARE DROPPING CALL

- A full-featured SVGA projector designed to fit your budget
- 800 x 600 resolution with intelligent compression to 1024 x 768
- AV capable with video and audio jacks for multimedia presentations



MEDIAFRAME 7200 CALL FOR BEST PRICE OR RENTAL

- Huge 42-inch diagonal screen size
- Only 6 inches deep, fits any viewing environment
- Gas plasma technology for crisp, brilliant images
- Ideal for DVD and high resolution computer graphics



BOXLIGHT 3650 CALL FOR LATEST PRICE

- 700 ANSI lumens for lights-on presentations to large audiences
- 800 x 600 pixels native; 1024 x 768 through elegant compression with no loss of detail
- UHP lamp with 3000-hour life



"Boxlight Certified" is our promise that the equipment we sell represents the leading edge of

presentation technology. We select the best designs, the latest innovations, and the most refined products available industry-wide—equipment produced by the world's most trusted manufacturers. Through demanding inspection, quality and reliability tests—and field trials—we ensure that these products will live up to or exceed your demands. Every BOXLIGHT product is protected by a money-back guarantee and lifetime tech support. No other projection company goes to this extent to guarantee your complete satisfaction.

Contact BOXLIGHT Toll Free from the U.S. & Canada:

Government: 800/ 497-4009 **Rental:** 800/ 736-6954
Resellers: 800/ 736-6956 **Fax:** 888/ 353-4242
International: 360/ 779-7901 **Education:** 800/ 689-6676

or browse: www.boxlight.com/pcmagazine/



CALL TO ORDER: 1-800/ 216-3396
PROJECTOR RENTALS: CALL 1-800/736-6954



Monday-Friday, 9am-5pm PST. Purchase order accepted with O.A.C. Prices subject to change. Quotes may be limited to stock on hand. Money-back guarantee does not apply to resellers and special orders. Price does not include sales tax. Call for complete details. BOXLIGHT and the BOXLIGHT logo are registered trademarks of BOXLIGHT Corporation. All other marks are the property of their respective owners.

19332 Powder Hill Place
Poulsbo, Washington 98370

The Best Price For Reliable Portable Multimedia Computers

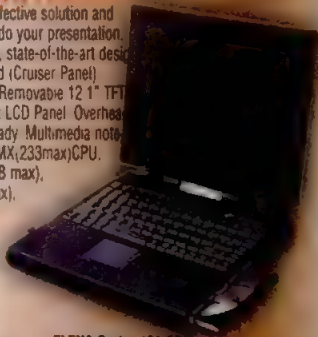
STANDARD FEATURES:

Intel Mobile chip set, Zoom Video ready, 1.44F/D, 128 bit Graphics Accelerator, Two Type II or One Type III PCMCIA Slots, TV Video-In port, Infra-red Port, Touch Pad, 16-bit Sound with Dual Speaker, Mic in and Lin In/out port, 1 Serial/1 Parallel, CRT Docking Port, LCD Status Indicator, USB port, 20x CDROM Lx/Bat, Windows 95 included, One year parts and labor warranty.

PRESENTATION NOTE

Most cost-effective solution and easy way to do your presentation. Cutting edge, state-of-the-art design.

U.S. Patented (Crusier Panel) *FEATURES Removable 12" TFT Active Matrix LCD Panel. Overhead Projector Ready. Multimedia notebook, 166MMX(233max)CPU, 32MB(128MB max), 2GB(5GB max), Starting at \$1,299.00



ELEMA Series (\$1,524)
12" 1" DSTN 166MMX 2G 5G max, 16M(80M max)
ELEMA T Series (\$1,809)
12" 1" TFT XGA 200MMX(233 max), 2G(5G max), 32M(80M max)
PHOENIX Series (\$2,218)
13" TFT XGA 200MMX 2G(5G max), 32M(80M max)
ELITE Series (\$2,625)
14" TFT XGA 200MMX(233 max) 2G(5G max), 32M(128M max)

****OPTIONS:**
Call for the Tilt/lock CPU
PCMCIA 33.6 modem \$79
PCMCIA 56k modem \$109
Leasing Program Available
GE 4 year protection \$165



You may find many companies offering super low prices for their machines, but you will never find a machine as reliable as Eiffel Technology's laptop computers for the price!

Our Commitment: Reliability. Reliability. Reliability.

Full Free 1-800-679-6730

<http://www.eiffeltech.com>

NetBuyer Marketplace

CHOOSE ANY SINGLE TITLE

FREE!

LIMITED TO FIRST 500 CALLERS



*pay just \$4.95 shipping & handling

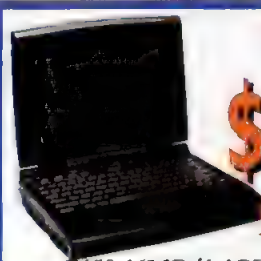
OR TAKE 3 FOR \$14.95 + S&H
OR GET ALL 6 FOR \$19.95 + S&H

To Order Call:

1-800-679-6730

MEDIA GRAPHICS INTERNATIONAL, INC.

NetBuyer Marketplace or InfoLink 760



COMPAQ

\$1,299.00

Presario 1090ES

P150 16MB/1.4GB HD 14xCD, 33.6 Mdm
10BT Network Card, 12.1" DSTN 3-yr Warranty

GUARANTEED!!

We will beat any advertised price on this magazine for the following products:

IBM, Compaq, Toshiba, Hewlett Packard, Apple

- * 30-Day money back guarantee
- * FREE shipping on notebooks
- * Quantity discount available

www.pc4sale.com

PC4 Sale (888) 729-7253

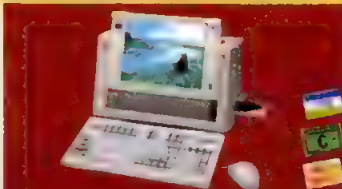
NetBuyer Marketplace or InfoLink 760

PC III PORTABLE COMPUTERS

For 15 years PCIII has been the leader in portable technology. We offer a Hi quality Reliable Lunch Box at an extremely affordable price!

- ▲ TFT/Dual Scan LCD Display
- ▲ 10.4"/12.1"/13.3" VGA/SVGA
- ▲ CPU: Pentium up to 266 MHz or Pentium Pro/Pentium II
- ▲ 6 Expansion Slots
- ▲ HDD: 1.6 GB to 9 GB
- ▲ RAM: 16 MB to 128 MB
- ▲ FDD/CD-ROM PCI 2 MB LCD Video Card
- ▲ Windows 95/Windows NT
- ▲ Portable with carrying handle
- ▲ All standard desktop components
- ▲ 23 lb — Easily moved

Customer Configurations Welcomed!



Applications:
Industry Portable Computer
Photo/Image Processing
Professional Instrument
Medical Instrument
Laboratory PC
Control Automation
Portable Server

PC PORTABLE MANUFACTURER INC.

<http://www.pc-portable.com>

800-818-2819

Fax: 818-444-1027



Your Continuity Is Our Business

ph 801-575-5465 • fax 801-532-5465

- Monitors any SNMP compatible device
- Simple user interface, i.e. red is bad/green is good!
- Notifies network manager of device alarm via display, audible, email, or pager
- Internet/remote monitoring — no distance limitation
- User friendly — 2 minutes to install/20 Minutes to learn

- Converts NT event log entries into SNMP traps
- Allows Internet/remote event log monitoring via Uptime Monitor, HP OpenView, Tivoli, or CA Unicenter

- Converts console error messages into SNMP traps
- Provides Alerts for server security, configuration changes, Server Console Activity, Disk Mirroring/Duplexing Status, etc.
- Allows remote console monitoring of error messages



Reseller Inquiries Welcome

NetBuyer Marketplace or InfoLink 761

BOLData Adventure Series

Build with Intel Pentium® processors with MMX™ technology, Intel® Celeron® processors
and the ALL NEW Intel® Celeron™ processor

The Adventure Classic

- Motherboard with TX Pro II PCI Chipset
- On-Board 512K of Pipelined Burst SRAM Cache
- 32MB Fast SDRAM Memory
- Integrated 64-bit Accelerated Video Graphics
- 2.1GB Ultra DMA Hard Disk Drive
- 24X IDE CD-ROM Drive
- Integrated Yamaha OPL4-ML 3D Wavetable Audio
- 1.44 Floppy Disk Drive
- Mid Tower Case with 230 Watt Power Supply
- Mitsumi 104 Key Enhanced Keyboard
- Logitech Mouse
- 80 Watt Stereo Speakers
- Microsoft® Windows® 95 CD-ROM
- Fully Tested and Burned In

Only
\$599!

200MHz Intel® Pentium® processor with MMX™ Technology ... **\$599**
233MHz Intel® Pentium® processor with MMX™ Technology ... **\$639**

BEST VALUE!

The Adventure Ultra

- Intel® AL440LX AGP Motherboard with USB
- 64MB Fast SDRAM Memory
- ATI Xpert@Work AGP Video with 4MB SGRAM
- 6.4GB Ultra DMA Hard Disk Drive
- 32X Toshiba IDE CD-ROM Drive
- Integrated Yamaha OPL3-SA3 Audio
- 1.44 Floppy Disk Drive
- Zoltrix 56.6 Fax/Modem with Voice Mail and Speakerphone
- Mid Tower Tool-Free Case with 235 Watt Power Supply
- Mitsumi 104 Key Enhanced PS/2 Keyboard
- Microsoft® PS/2 Mouse
- 80 Watt Stereo Speakers
- Microsoft® Windows 95 CD-ROM
- Fully Tested and Burned In

266MHz Intel® Celeron® processor ... **\$1,095**
233MHz Intel® Pentium® II processor ... **\$1,145**
266MHz Intel® Pentium® II processor ... **\$1,200**
300MHz Intel® Pentium® II processor ... **\$1,340**
333MHz Intel® Pentium® II processor ... **\$1,505**

The Adventure Star-2

- AGP Motherboard with Intel® 440LX chipset and USB
- 64MB Fast SDRAM Memory
- Trident 3D Image 9750 AGP Graphics Adapter w/4MB SGRAM
- 4.3GB Ultra DMA Hard Disk Drive
- 24X IDE CD-ROM Drive
- Onboard 3D Sound Pro
- 1.44 Floppy Disk Drive
- 56.6K Fax/Modem
- Mid Tower Case with 230 Watt Power Supply
- Mitsumi 104 Key Enhanced Keyboard
- Logitech Mouse
- 80 Watt Stereo Speakers
- Microsoft® Windows 95 CD-ROM
- Fully Tested and Burned In

266MHz Intel® Celeron® processor ... **\$799**
233MHz Intel® Pentium® II processor ... **\$855**
266MHz Intel® Pentium® II processor ... **\$905**
300MHz Intel® Pentium® II processor ... **\$1,050**
333MHz Intel® Pentium® II processor ... **\$1,205**

The Adventure Xtreme

Features the new
100MHz System Bus
for **MAXIMUM SPEED!**

- New 100MHz System Bus
- Intel® SE440BX Motherboard with USB
- 64MB Fast SDRAM Memory
- New Intel® I740 based AGP 3D Graphics Accelerator with 8MB SDRAM
- 6.4GB Ultra DMA Hard Disk Drive
- DVD II ROM Drive with MPEG II DVD Decoder Card
- Integrated PCI Crystal 3D Wavetable Audio
- 1.44 Floppy Disk Drive
- Zoltrix 56.6 Fax/Modem with Voice Mail and Speakerphone
- Mid Tower Tool-Free Case with 235 Watt Power Supply
- Mitsumi 104 Key Enhanced PS/2 Keyboard
- Microsoft® PS/2 Mouse
- 80 Watt Stereo Speakers
- Microsoft® Windows 95 CD-ROM
- Fully Tested and Burned In

333MHz Intel® Pentium® II processor ... **\$1,599**
350MHz Intel® Pentium® II processor ... **\$1,739**
400MHz Intel® Pentium® II processor ... **\$1,999**



BOLData™
S Y S T E M S

800-923-BOLD

Visit us on the WEB at
www.boldata.com

Copyright © 1998, BOLData Technology, Inc. BOLData, the BOLData logo, Adventure Classic, Adventure Star-2, Adventure Ultra, Adventure Xtreme, and NetBuyer are registered trademarks and MMX and Celeron are trademarks or registered trademarks of their respective owners.

Fremont • Toronto • Taipei • Hong Kong • Singapore

NetBuyer Marketplace

Get Trained, Get Certified, **GET PAID!**

ForeFront offers the fastest and easiest way to fully prepare you for a career in the ever expanding Information Technology (IT) industry. Our Self-Study Courses are 100% Computer Based Training (CBT) on CD-ROM to give you flexibility unmatched by traditional training methods. Study at your own pace using our proven step-by-step format, whenever and wherever it's convenient for you!

- Boost Your Income
- Enhance Your Credentials
- Increase Your Skills and Competence
- Study at Your Own Pace
- Hands-on Interactive Simulations

Become MCSE Certified...FAST!

The ForeFront MCSE Self-Study Course™ ensures the highest rate of information retention so that when you complete your training you'll be fully prepared to pass your MCSE exams. You'll be ready and confident to go into the workplace to effectively plan, implement, maintain and support information systems in a wide range of computing environments using Windows NT and other Microsoft® Server products.

Call now to get more details!

Become CNE Certified...FAST!

The ForeFront CNE Self-Study Course™ provides fast, effective and convenient training to anyone wishing to become a Certified Novell Engineer, even when hampered by a busy schedule. Our CNE CBT allows you to learn and practice *everything* you'll need for full Novell certification.

Call now for more information!

Become A+ Certified...FAST!

Getting A+ Certified will help open the way to further advancement in the high-tech industry.

The ForeFront A+ Certification Self-Study Course™ is a hands-on self-study course that will give you all the technical material, knowledge and interactive exercises you'll need to pass your exams and excel in today's competitive PC repair marketplace. **Call now to learn more!**

- Free Technical Support
- Expert Career Consultants
- Next Day Shipping
- Performance Guaranteed

Call for Special Discount Pricing Today!

1-800-475-5831

(813) 724-8994 • FAX (813) 726-6922

Copyright ©1998 ForeFront Direct, Inc. All Rights Reserved. ForeFront MCSE, CNE and A+ Certification Self-Study Courses are trademarks of ForeFront Direct, Inc. The ForeFront Logo is a trademark of the ForeFront Group, Inc. All other trademarks are the properties of their respective holders. ForeFront Direct, Inc. is a subsidiary of ForeFront Group, Inc.

Get the A+ Course FREE!

Call Now to find out how you can get the ForeFront A+ Self StudyCourse **FREE!**

Offer valid for a limited time.

FOREFRONT™

25400 U.S. Hwy. 19 N., #285
Clearwater, FL 33763

NASDAQ: FFGI GSA# GS-35F-4628G PMAL

NetBuyer Marketplace or infoLink 702

Design and Print Your Own Checks!



\$50 Cash Back
when purchased along with
MS Money 98 Financial Suite
Through June 30, 1998

- Works with Quicken, QuickBooks, MS Money & ANY accounting software
- Save 50%-80% vs. pre-printed checks
- Creates bank drafts & deposit slips
- Import / export QIF-ASCII files



VersaCheck™ PRO
ERP \$99.99

"VersaCheck is one honey of a program, and it's one you ought to grab on your way home tonight, unless you like spending more money than you must."
-The Washington Times, February '98

Also look for: VersaCheck for MS Word ERP \$39.99 VersaCheck Personal ERP \$19.99

COMPUSA
800-COMPUSA

STAPLES
1-800-333-3339

Fry's

OfficeMax
800-788-8088

Micro Center

TigerSoftware
800-888-4437

COMPUSA
800-COMPUSA

mips

Dateline America, Inc.
Tel: 619-679-4070 Fax: 619-679-4073

800-898-8560
www.mipsdla.com

NetBuyer Marketplace

TN3270E TN5250 VT420 LPD FTP

Distinct® IntelliTerm™

distinct

Free evaluation at
www.distinct.com
408-366-8933

Training Videos for Windows Software

KEYSTONE LEARNING SYSTEMS CORP.

Microsoft Solution Provider



Dan Balter
Microsoft MCS & Windows NT Instructor

Windows NT 4.0

- Server Admin. Lev 1 \$89.95
- Server Admin. Lev 2 \$89.95
- Entp. Admin. Lev 1 \$89.95
- Entp. Admin. Lev 2 \$89.95
- Serv. & Wrk. Install \$89.95
- Workstn. Admin. Lev 1 \$89.95
- Workstn. Admin. Lev 2 \$89.95
- Workstn. Admin. Lev 3 \$89.95
- Advanced Level 1 \$89.95
- Advanced Level 2 \$89.95
- Advanced Level 3 \$89.95
- Workstn. User Lev 1 \$49.95
- Workstn. User Lev 2 \$49.95
- Special All Thirteen \$859.95



Dennis Taylor
Microsoft Excel Specialist & Excel Instructor

Excel 97

- Beginning \$49.95
- Intermediate \$49.95
- Advanced \$49.95
- Power Features \$49.95
- Pivot Tables \$49.95
- Shortcuts & Ideas \$49.95
- Special All Six \$239.95
- Also Available on CD-ROM

Project 98

- Level 1 \$89.95
- Level 2 \$89.95
- Level 3 \$89.95
- Level 4 \$89.95
- Level 5 \$89.95
- Special All Five \$379.95



Dawn Bjork
Microsoft Word 97 & Word Instructor

Word 97

- Beg/Int/Adv (ea) \$49.95
- Special All Three \$129.95
- DTP Mail Merge (ea) \$49.95
- Tables & Forms \$49.95
- Internet \$49.95
- Special All Seven \$279.95
- Also Available on CD-ROM

Windows 95

- Beg/Int/Adv (ea) \$49.95
- Special All Three \$129.95
- Networking \$49.95
- Installation \$49.95
- Plus & Spec. Features \$49.95
- Special All Six \$239.95



Alison Balter
Microsoft Certified Developer & Access Instructor

Office 97

Special MS Office 97 Video Combinations

- MS Office 97 Plus (16 videos/32 hours)\$579.95 (with KeyNotes \$749.95)
- MS Office 97 Pro (13 videos/26 hours)\$495.95 (with KeyNotes \$629.95)
- MS Office 97 Standard (9 videos/18 hours)\$349.95 (with KeyNotes \$499.95)

Lotus SmartSuite

Special Lotus SmartSuite 97 Video Combinations

- Lotus SmartSuite 97 Plus (16 videos/32 hours)\$579.95
- Lotus SmartSuite 97 Pro (13 videos/26 hours)\$495.95
- Lotus SmartSuite 97 Standard (9 videos/18 hours)\$349.95

MCSE

Special MCSE Certification Training

- MCSE Certification Plus (10 videos/20 hours/Exam Simulations)\$1,999.95
- MCSE Certification Pro (10 videos/20 hours)\$1,499.95

Over 525 Titles

Domestic Shipping 2-3 Days \$5.00 Flat
the first two videos, plus \$1.50 for each additional video tape

30 DAY Money Back Guarantee

Other versions available
Learners may vary, call for pricing

KeyNotes

© 1998 Keystone Learning Systems Corp. All rights reserved. Microsoft, Windows, Excel, Word, and Office are registered trademarks of Microsoft Inc. Lotus SmartSuite, Lotus SmartSuite 97, and Lotus SmartSuite 97 Plus are registered trademarks of Lotus Inc. Microsoft, Windows, Excel, Word, and Office are registered trademarks of Microsoft Inc. and Lotus Corp., respectively.

NetBuyer Marketplace

"QUICKSWIPE ELECTRONIC TIME CLOCK"

Time & Attendance & Employee Scheduling

\$899 INCLUDES

- HOURTRACK 98 (20 Employee Version)
- 25 Bar-Code Badges
- 50' RS-232 Cable
- Instructional Video



V-I-T-R-I-X

1 800-561-6366
<http://www.vitrix.com>

Net "An Impressive Time and Attendance System"

PC "Ideal for the Human Resources Professional"

NetBuyer Marketplace or Intolink 763

DeSolMicro

Call 1.888.881.6838 or Fax your order to 1.510.891.8899

We will match or beat any competitor's price!

Adobe	Microsoft	
Acrobat 3.0 CD	199	FrontPage 98 CD
Illustrator 7.0 CD	299	Office 97 Pro w/Backup CD & True Intelligence
PageMaker 6.5 CD	299	Office 97 Business Ed CD & True Intelligence
Photoshop 4.01 CD	299	Office 97 Std. CD & True Intelligence
Premiere 4.2 CD	399	Project 98 CD
CorelDraw 8 CD	275	Windows 95 682.5 Version 3
Corel WordPerfect Suite 8 CD	99	Windows 95-5 user license pack
Lotus Smart Suite 97 CD	95	Visual Basic Pro 5.0 CD
		Visual C++ Pro 5.0 CD
		NT Workstation 4.0 CD license
		NT Workstation 4.0 CD
		NT Server 4.0 /10/29 Lic.
		BackOffice 98 Sys. Server 4.0 w/10 Client Lic.

VISA **MasterCard** **Corporate** **Government** **or school's** **or Welcome**

425/call/sell **1298**

NetBuyer Marketplace or Intolink 764

PC Technicians: Get Certified. Make more money..

Did you know that being a certified technician can dramatically increase your salary?

For example, according to MCP Magazine, last year's average salary for a certified MCSE (Microsoft Certified Systems Engineer) was \$56,000! Improve your career and income NOW! Call for current course pricing.

We offer easy to understand courses on CD with all the materials you'll need to become certified for MCSE, CNE (Certified Novell Engineer) and A+ (General Systems Certification) — and our tech support is top notch.

Then equip yourself with the top-rated diagnostic tools on the market—our award-winning Micro-Scope™ 6.5 & POST-Probe™ diagnostic card.

This Universal Diagnostic Toolkit™ will allow you to quickly debug "dead" PCs and 100% accurately diagnose what's wrong with any Intel-compatible PC in a flash regardless of O/S. Used by the Army, Navy, Air Force and other branches of the U.S. Govt., and many major corporations around the world.



Call 1-800-864-8008
(818) 547-0125 • netsales@micro2000.com
www.micro2000.com

NSN 7025-01-443-3383

BYTE **95**

A Toast to the Host with the Most... for the Least!



**Basic Plan—
\$19.95
per month**

INTERNET PREMIER PARTNER!

- 60 Megabytes of Storage • 2500 Megabytes of Monthly Transfer
- 10 POP3 E-mail Accounts • Full CGI Access and Support
- FrontPage™ 98 Support • Secure Server • Same day Setup
- 24 x 7 Tech Support • 30-day Moneyback Guarantee

Ask about our profitable reseller programs!

World with Internet

Publishing Corp.

Microsoft FrontPage™ 98 • Microsoft Windows NT Servers

Call 1-800-785-5170
(501) 884-3800 • <http://www.wipc.net>

NetBuyer Marketplace or InfoLink 765

WEB HOSTING

\$19.95

- Same day set-up
- Microsoft Front Page™
- Cold Fusion™
- CyberCash™
- 99.5% uptime
- Real Audio™
- Secure Server
- CGI directory
- High-speed UNIX & Windows NT™

www.houseit.com

888-246-8730 Microsoft
305-374-3031 **FrontPage98**

WIN PROXY

PROXY/MAIL SERVER FOR WINDOWS NT/95

FROM \$99.00

- ❑ Connect your LAN to the Internet with 1 modem!
- ❑ Increase throughput and lower your connection fees!
- ❑ Safeguard your data with the firewall
- ❑ Transfer all your email with the built-in mail server
- ❑ Best rating from: 

ORDER ONLINE! www.winproxy.net

NetBuyer Marketplace or InfoLink 765

iNtegrate maciNTosh printers



with PC MACLAN for Windows NT

Introducing the only complete peer-to-peer networking solution for sharing printers, files, drives and more between a Windows NT 4.0 Workstation or Server and a Mac OS machine!

- Print to AppleTalk or PostScript Printers from a PC
- Complement AppleTalk File and Print Services on NT Server
- Use NT Workstation as an AppleShare File Server
- Share NT Files, Drives, and Volumes with AppleTalk Networks



Call Now for a Free Demo!

1-888-722-2723 • www.miramarsys.com

Web Hosting

NT Speed



- Microsoft IIS 3.0
- Active Server Pages support
- Cold Fusion 3.1 support
- FrontPage 98 support
- SSL secure server access
- Database hosting
- RealAudio/RealVideo
- Shopping Cart

Excellent Referral and Reseller programs

Plans start from **\$14.95/month***

SiteHosting.net
<http://sitehosting.net>

Toll free: (888) 463-6168 E-mail: info@sitehosting.net

*Does not include set up fee, and InfoLink domain registration fees.

Sign Up Today!

AnaServe Web Hosting

✓ Multiple T3 Connections to 13 Providers	✓ Proprietary Control Panel
✓ Same-Day Domain Registration (M-F)	✓ Microsoft® FrontPage® 98 and NT Support
✓ 99.5% Uptime Guaranteed	✓ Custom CGI Programming Available
✓ Sun Ultra II Web Servers on ATM Backbone	✓ Java, PERL, C/C++ Supported
✓ Bay Networks Backbone Node Routers	✓ Free Technical Support
✓ Graphical Website Traffic Reports	✓ 24 x 7 Network Monitoring

Optimal Performance Opportunity Available Plans From **\$24.95** per month

(800) 711-6030
www.anaserve.com
(714) 250-7262

 **ANASERVE**
The Future of Web Hosting

Same Day Service

Long-Life, Fresh Batteries, Overnight

Every Battery for Every Portable, Call for Yours!

AST, Compaq, DEC (Digital), Duracell, IBM, Macintosh, NEC, Texas Instruments, Toshiba, Twinhead/Sharp, Winbook, + 7,000 others

We also carry every battery for cellular phones, two-way radios, camcorders, and cordless phones

Corporate Pricing Available.

Number Crunching Made Easy
50% thinner and 40% lighter. **Only \$59.00**

Thousands of Tools and Accessories to choose from. Call now for your free mobile products catalog.



Item#: 24232

1-800-Batteries
Batteries and Tools for Mobile Professionals™

Call now: 1-800-Batteries
1-800-228-8374

Web orders **SAVE \$2.50** • www.1800Batteries.com • Free recycling of spent rechargeable batteries

NetBuyer Marketplace

Don't Wait 'til the Lights Go Out

If you've depended on your UPS for more than 3 years, you may be on borrowed time. We recondition battery back-up systems for a fraction of the cost of a new one:

- Less cost than trade-in programs
- Battery replacement
- Full 18-month warranty
- Complete inspection & repair
- Loaner units available

wholesale pricing for resellers

CBM COMMERCIAL BUSINESS MACHINES

PCM

1-888-2 FIX UPS

Mouse Pads



Custom Printed
• Your Logo Design

• Fast Turnaround

• Guaranteed Quality

MicroStore™
800-962-8885

FAX: 507-665-2604

LE SUEUR, MN 56058

Wrist Supports

72 PIN DIMMS (79.95)

Manufacturer	Model	Price	Notes
Kingston	Value	\$12.95	100MHz
PC85	Value	\$12.95	100MHz
PC100	Value	\$12.95	100MHz
PC133	Value	\$12.95	100MHz
PC166	Value	\$12.95	100MHz
PC200	Value	\$12.95	100MHz
PC266	Value	\$12.95	100MHz
PC333	Value	\$12.95	100MHz
PC400	Value	\$12.95	100MHz
PC500	Value	\$12.95	100MHz
PC600	Value	\$12.95	100MHz
PC700	Value	\$12.95	100MHz
PC800	Value	\$12.95	100MHz
PC900	Value	\$12.95	100MHz
PC1000	Value	\$12.95	100MHz

DIMMS (79.95)

Manufacturer	Model	Price	Notes
Kingston	Value	\$12.95	100MHz
PC85	Value	\$12.95	100MHz
PC100	Value	\$12.95	100MHz
PC133	Value	\$12.95	100MHz
PC166	Value	\$12.95	100MHz
PC200	Value	\$12.95	100MHz
PC266	Value	\$12.95	100MHz
PC333	Value	\$12.95	100MHz
PC400	Value	\$12.95	100MHz
PC500	Value	\$12.95	100MHz
PC600	Value	\$12.95	100MHz
PC700	Value	\$12.95	100MHz
PC800	Value	\$12.95	100MHz
PC900	Value	\$12.95	100MHz
PC1000	Value	\$12.95	100MHz

SDMM MODULES (29.95)

Manufacturer	Model	Price	Notes
Kingston	Value	\$12.95	100MHz
PC85	Value	\$12.95	100MHz
PC100	Value	\$12.95	100MHz
PC133	Value	\$12.95	100MHz
PC166	Value	\$12.95	100MHz
PC200	Value	\$12.95	100MHz
PC266	Value	\$12.95	100MHz
PC333	Value	\$12.95	100MHz
PC400	Value	\$12.95	100MHz
PC500	Value	\$12.95	100MHz
PC600	Value	\$12.95	100MHz
PC700	Value	\$12.95	100MHz
PC800	Value	\$12.95	100MHz
PC900	Value	\$12.95	100MHz
PC1000	Value	\$12.95	100MHz

CPU CHIPS

Manufacturer	Model	Price	Notes
Intel	Pentium	\$12.95	100MHz
AMD	K6	\$12.95	100MHz
Cyrix	6x86	\$12.95	100MHz
Siemens	68000	\$12.95	100MHz
Motorola	68000	\$12.95	100MHz
IBM	PowerPC	\$12.95	100MHz
Apple	PowerPC	\$12.95	100MHz
NEC	V850	\$12.95	100MHz
Hitachi	SH-3	\$12.95	100MHz
Sharp	SH-3	\$12.95	100MHz
Sony	SH-3	\$12.95	100MHz
Toshiba	SH-3	\$12.95	100MHz
Winbond	SH-3	\$12.95	100MHz
Winbook	SH-3	\$12.95	100MHz
Winmodem	SH-3	\$12.95	100MHz
Winzip	SH-3	\$12.95	100MHz
Winrar	SH-3	\$12.95	100MHz
Winreg	SH-3	\$12.95	100MHz
Winnt	SH-3	\$12.95	100MHz
Win95	SH-3	\$12.95	100MHz
Win98	SH-3	\$12.95	100MHz
Win2000	SH-3	\$12.95	100MHz
WinXP	SH-3	\$12.95	100MHz
WinVista	SH-3	\$12.95	100MHz
Win7	SH-3	\$12.95	100MHz
Win8	SH-3	\$12.95	100MHz
Win10	SH-3	\$12.95	100MHz
Win11	SH-3	\$12.95	100MHz
Win12	SH-3	\$12.95	100MHz
Win13	SH-3	\$12.95	100MHz
Win14	SH-3	\$12.95	100MHz
Win15	SH-3	\$12.95	100MHz
Win16	SH-3	\$12.95	100MHz
Win17	SH-3	\$12.95	100MHz
Win18	SH-3	\$12.95	100MHz
Win19	SH-3	\$12.95	100MHz
Win20	SH-3	\$12.95	100MHz

MEMORY! BUY, SELL, TRADE, UPGRADE.

We'll BUY your excess or now computer memory. We BUY Back All Types of Memory... 72 pin, 168 pin, 20 pin, DIMMS, SIMMS, Notebook Memory. Any type of memory, working or not. Also we Buy Back working Hard Drives and CPU chips. Call us and get a price.

IBM NOTEBOOK & LAPTOP MEMORY

Model	Price	Notes
Model 1	\$12.95	100MHz
Model 2	\$12.95	100MHz
Model 3	\$12.95	100MHz
Model 4	\$12.95	100MHz
Model 5	\$12.95	100MHz
Model 6	\$12.95	100MHz
Model 7	\$12.95	100MHz
Model 8	\$12.95	100MHz
Model 9	\$12.95	100MHz
Model 10	\$12.95	100MHz
Model 11	\$12.95	100MHz
Model 12	\$12.95	100MHz
Model 13	\$12.95	100MHz
Model 14	\$12.95	100MHz
Model 15	\$12.95	100MHz
Model 16	\$12.95	100MHz
Model 17	\$12.95	100MHz
Model 18	\$12.95	100MHz
Model 19	\$12.95	100MHz
Model 20	\$12.95	100MHz

TOSHIBA LAPTOP MEMORY

Model	Price	Notes
Model 1	\$12.95	100MHz
Model 2	\$12.95	100MHz
Model 3	\$12.95	100MHz
Model 4	\$12.95	100MHz
Model 5	\$12.95	100MHz
Model 6	\$12.95	100MHz
Model 7	\$12.95	100MHz
Model 8	\$12.95	100MHz
Model 9	\$12.95	100MHz
Model 10	\$12.95	100MHz
Model 11	\$12.95	100MHz
Model 12	\$12.95	100MHz
Model 13	\$12.95	100MHz
Model 14	\$12.95	100MHz
Model 15	\$12.95	100MHz
Model 16	\$12.95	100MHz
Model 17	\$12.95	100MHz
Model 18	\$12.95	100MHz
Model 19	\$12.95	100MHz
Model 20	\$12.95	100MHz

The Memory Liquidators

(800) 718-7755

Web: www.memoryliquidators.com or E-mail: sales@ml.win.net

531 Main St., El Segundo, CA 90245 • 310-326-5456 • Fax: 310-326-7790 • M-F 8:00 am to 5:00 pm PST
Prices subject to change without notice

NetBuyer Marketplace

1-800-4 MEMORY

MEMORY SELL•BUY•TRADE

WE CAN BEAT ANY QUOTED PRICE IN THIS MAGAZINE FOR MEMORY!!!

- Lifetime Warranty
- No Credit Card Surcharge
- No Restocking Fee

CALL AROUND THEN CALL US!!!

[HTTP://18004MEMORY.COM](http://18004MEMORY.COM)

NetBuyer Marketplace or Infolink 651

PC UPGRADE

MBoard w/200mx Sound & Video \$159

MBoard w/P11 233 w/AGP \$399

MEMORY CPU

16MB \$26 PII 400 \$899

32MB \$52 PII 350 \$699

64MB \$129 PII 333 \$639

SDRAM P 233 \$209

32 \$59 AMD

64 \$139 K6 266 CALL

INTEL...CYRIX...AMD

MASSIVE STORAGE

2.5 WD \$149 5.1 WD \$229

4.3 WD \$199 6.4 WD \$269

GIGABYTE MB - GA586T2 \$109

M BOARD-V CARDS-MODEMS-CD-ETC

MIAMI INT'L FAX (305) 436-0926

FOR CURRENT PRICES & MORE PRODUCTS

computerupgrades.net

M - F 9am - 8pm SAT 12pm - 5pm EST

1-800-621-8309

VISA MC AMEX DISCOVER

PRICES SUBJECT TO CHANGE

MMX Deals

Motherboard CPU w/fan

166 - \$165 200 - \$175 233 - \$223

Add a Case to any for \$ 45.

Free Assembly.

CPU's 166 200 233

MMX \$105 \$125 \$190

AMD K6 \$128 \$150

Pentium II

233MHz \$279. 266MHz \$378. 300MHz \$535.

32 MB of memory as low as US\$ 60.00

Motherboards

VXProII audio for Pentium MMX - AMD K56 \$57

TXPro for Pentium MMX - AMD K56 \$78

TXPro TOPGUN with 1MB cache on board \$90

TXPro w/AGP video and audio - for Pentium/AMD \$90

Triton 430TX - Jumperless w/audio \$90

440LX for Pentium II 233-333MHz AGP \$128

Intel AL440LX for Pentium II AGP w/audio \$191

Call for more options or visit our

web site for electronic catalog

Your best option since 85

DLP Computers

800-241-2093

www.dlpcomputers.com

Mon to Fri 10 am to 8 pm and Sat 10 am to 5 pm EST

Prices subject to change without notice

NetBuyer Marketplace or Infolink 653

A DIRECT MEMORY MANUFACTURER FOR ALL MAJOR OEMS!

- Corporations
- Government
- School Districts

Visa & Mastercard
EDI & Compac Card



Refer to our
Web Site for
Current Pricing

888-967-6846

WWW.POINTRONICS.COM

NetBuyer Marketplace

ACME

Acme Micro Systems Inc.

800-313-ACME

Brand Names at Lower Prices

INTEL • Microsoft
IBM • 1 COM • CISCO
Adaptec • Super Micro
ASUS • Eyan • Hyman

CLASSIFIED
Shop NetBuyer Marketplace. Go to www.netbuyer.com. Click on Marketplace. Hundreds of ads, plus links to the Web sites of NetBuyer Marketplace advertisers.

POINT OF SALE • BARCODING

DOS/WINDOWS

POS
Inventory
AR/AP/GL/PO/WO
Label Printing
Full Reporting

\$799

Includes hardware



WINDOWS

POS
Full Reporting
Barcode Printing
Inventory
Interface w/P'Tree & Quickbooks

\$1349

Includes hardware

LARGEST SELECTION OF POS PRODUCTS!

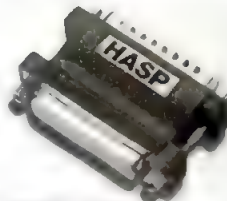
Epson, Star, Citizen receipt printers ... from \$229
CCD bar code readers from \$159
Cash drawers from \$129
Barcode label printers from \$399
Portable data collectors from \$399
Indiana POSHOE from \$269



Call **800-390-6623** Se habla Español
Ph. **404-352-3587** Fax **404-352-3589**
Visit our website <http://www.nurol.com>

Software Developers!

PROTECT YOUR Software. INCREASE YOUR Revenues.



With software piracy costing you 50% of your revenues, you can't afford not to protect! HASP® is the industry's most secure, flexible and easy-to-use software protection solution - rated #1 by the NSTL! HASP will help you increase sales, control distribution, prevent piracy, monitor network licensing, and much more!

To learn how you can easily sell more software - call now to order your HASP Developer's Kit!

North America
800-223-4277, 212-564-5678, Fax: 212-564-3377
E-mail: hasp.sales@us.aks.com
International
+972-3-636 2222 Fax: 972-3-537 5796
E-mail: hasp.sales@aks.com

www.aks.com

ALADDIN

The Professional's Choice

NetBuyer Marketplace

Barcoding just got a lot easier...

Software Support • Custom Solutions • POS Peripherals
Service & Repair

Keyboard Wedge Solutions

- **Hand-Held Laser**
starting at... **\$259**
- **60mm or 80mm CCD**
special price... **\$139**
- **Hewlett Packard Wand Reader** **\$129**



1-800-375-9063
215-396-0308
www.data-vision.com

DATA VISION
Barcoding just got a lot easier

Call For Our Free Catalog

POINT OF SALE Inventory Control

Software & Hardware for:

- Retail/Wholesale
 - Mail Order
 - Internet Commerce
 - Rentals
 - Service/Repair
 - Manufacturing
 - Kiosk Development
- Fully Integrated Accounting • Multi-Site Polling
Demo's available on web site or CD Rom
Barcode Readers • Receipt Printers
Cash Drawers • Mag Stripe • Ribbons/Paper/Labels
Credit Card Authorization & Deposit Software

www.posdirect.com

(800) 622-7670 • sales@posdirect.com
(618) 985-8237 vox • (618) 985-3014 fax



Cutting Edge Retail Technologies

NetBuyer Marketplace

All Your Bar Code Needs



- **Best Prices**
- **Volume Discounts**
- **Your Own Free Technical Consultant**
- **Toll Free Technical Support**
- **Same Day Shipping**
- **30-Day No Hassle Money Back Guarantee**

Free 100 Page Catalog

www.systemid.com
800-397-9783
972-516-1100

SYSTEM ID

Buy/Sell/Trade, New & Used

NETWORKING

Routers • Switches • Hubs

Visit Our **WEBSITE** for a complete listing of products at www.biznet.com

NY Office: Tel: (315) 458-9406 Fax: (315) 458-9493
Main Office: Tel: (978) 867-4926 Fax: (978) 863-0607

BIZNET

Business Information Systems International, Inc.

NetBuyer Marketplace or Intolink 654

Designed to be **the BEST**

For ease of use, superior technical support and the absolute best pricing for

BAR CODE SCANNING EQUIPMENT...

SEARCH NO MORE

PLUG AND PLAY!!!

Wand/Decoder **\$115** Intelligent Wand **\$125** 80mm CCD Scanner **\$135**
Symbol Laser Scanner **\$299** 2 Track Mag. Stripe Reader **\$115**

For More Information See Us at: www.zebex.com
e-mail: sales@zebex.com Retailers only

ZEBEX AMERICA, INC.

908-359-2070 Fax 908-359-1272

ZEBEX America West NewPort Beach, CA
714-474-9595 Fax 714-474-9550

NetBuyer Marketplace

OWN YOUR OWN CONSULTING FIRM

Provide outsourced Technical, Financial & Consulting Services to Businesses and Professional Firms in your area

Complete Training Certification, Tools, Equipment, and on-going support

- ★ Customized operations and marketing plan
- ★ Full time, part-time, office or home based
- ★ Nationwide marketing plus much more

Guaranteed financing!
Get started for as low as \$1,000 down!

Call today for free information

JC CONSULTING

800-531-7953

NetBuyer Marketplace or Intolink 655

SOFTWARE SALE

Microsoft Office 97 Std.....	\$210
Microsoft Office 97 Pro.....	\$Call
Microsoft Office 4.3 Pro.....	\$250
Microsoft Win Svr.NT 4.....	\$475
Microsoft WinWrk.NT 4.....	\$169
Microsoft Frontpage 98.....	\$ 85
MS Visual Basic Pro 5.....	\$190
MS Word/Excel(Each).....	\$150
MS Project 98.....	\$270
Adobe Photoshop 4.01.....	\$360
Adobe Pagemaker 6.5.....	\$310
Adobe Illustrator 7.....	\$230
Adobe After Effects.....	\$390
Macromedia Freehand 8.....	\$230
Claris Filemaker pro 4.....	\$150
Autocad LT W/97.....	\$325

T.I.Net

1(800) 258-0297

FAX: 1-(800) 260-3988

All trademarks are property of their respective owners. prices subject to change.

NetBuyer Marketplace or Infotink E55

HOME STUDY
OUR 48TH YEAR
Accredited
B.S. Degree
in Computer Science
or Computer Engr. Tech.

Detailed and explicit lesson materials and instructor assistance with special problems when needed. Lessons in C, C++, Windows 95, Java, Networks, Database Design, Software Design and many more as needed in either program, leading first to your Associate Degree and then to your Bachelor Degree. Accredited Member DETC-VA Approved.

Call For Free Catalog • Toll Free
888-919-8181

GRANTHAM COLLEGE
OF ENGINEERING
E-mail: gce@grantham.edu
Web site: <http://www.grantham.edu>
GRANTHAM COLLEGE ROAD,
SLICK, LA 70469-5700

ADDRESS FOR SUCCESS<http://www.aics.edu>

- Earn B.S. and M.S. in Computer Science
- DISTANCE EDUCATION
- Object oriented B.S. program
- New courses in Java, Networking, HTML, MIS
- Approved by more than 275 companies
- Follows ACM/IEEE guidelines

AMERICAN
INSTITUTE
COMPUTER
SCIENCES

Free catalogue
1-800-767-AICS or
<http://www.aics.edu>

ACCREDITED
MEMBER
World
Association
of Universities
and Colleges

NetBuyer Marketplace or Infotink E57

Special Dealer/VAR Discounts Available!**Portable Readers**

- Operates on one 9-volt battery
- 54-key alpha/numeric keyboard
- Date and time stamps
- Auto power off with resume
- Incorporates American Microsystems' industry-leading decoding algorithm

We Proudly Feature**symbol®****Laser Scanners!****30-day No Risk Guarantee!**

The **Power** to
be **Efficient.**

**CCD Packages**

- Including decoder & cables
- Very fast and accurate
- No moving parts to break
- Completely solid state
- Ergonomic design
- Very rugged and durable
- Less expensive than lasers

45 67890

Label Design Software

- Full range of bar code capabilities
- Very easy to use
- Full featured label design software for Windows
- Scalable fonts
- Rotatable text and graphics
- Floating color and tool bars

Lifetime Toll-free SUPPORT!**Omnidirectional Laser Packages****NEW!****Mag Stripe Packages**

- Includes decoder & cables

CALL NOW FOR A FREE CATALOG!

AMERICAN
MICROSYSTEMS, LTD

phone 817 571 9015 • fax 817 685 6232
2190 Regal Parkway • Euless, Texas 76040

800 648 4452 WWW.AMLTD.COM**15 years in business • 30-day money back guarantee • Same-day shipping**

NetBuyer Marketplace



It's **NEW**, and it's **HOT!**

Add HIGH QUALITY, royalty-free MUSIC to your business presentations, documents, multimedia applications & E Mail for only \$39.95 + \$2.00 postage! (Md. residents add 5% tax.)

www.houseofwave.com
1-888-367-5200
Fax: 1-410-381-7896

#1 Home Business

Cash in with your phone and a computer!



Get started today from \$998 (0% interest leasing)



VoiceWorld.com

800.283.4759
602.922.5500

NetBuyer Marketplace or Intalink 508

PLAN TO BAR CODE?

DATA RECOGNITION IS YOUR SUPPLIER FOR HUNDREDS OF BAR CODE PRODUCTS

SCAN IT!



LS 4000

symbol

- GREAT PRICE AND PERFORMANCE
- MULTIPLE INTERFACES AVAILABLE
- LIFETIME SCAN ELEMENT WARRANTY

PRINT IT!



Monarch

- INDUSTRIAL STRENGTH THERMAL TRANSFER PRINTER
- EASY TO USE; EASY TO OWN
- ON-SITE SERVICE

TRACK IT!



StrandWare

BACKTRACK™

- FULLY INTEGRATED TRACKING DATABASE AND LABEL DESIGNER
- APPLICATION TEMPLATES AND 250+ THERMAL PRINTER DRIVERS
- MODULES TO SUPPORT SYMBOL PDT 3100 AND COMSEE APEX II TERMINALS
- DEVELOPER, RUN TIME AND NETWORK LICENSES



**DATA
RECOGNITION
INC.**

1-800-541-9645

2929 LONGHORN BLVD., SUITE 103
AUSTIN, TX 78758-7628

**NEW!
ON-LINE CATALOG**
www.datarecognition.com

SAME-DAY SHIPPING* OF IN-STOCK PRODUCTS FROM SYMBOL TECHNOLOGIES, MONARCH, STRANDWARE AND ALL MAJOR MANUFACTURERS. RESELLERS: SPECIAL PRICING

*ORDER BY 3 P.M. CST

NetBuyer Marketplace

Computer Checks

For Laser/Inkjet Printers
**GUARANTEED LOWEST
PRICE IN THE COUNTRY!**

- FAST turn-around time
- FAST, low-cost shipping
- Compatible with Quicken®, Quickbooks®, MS Money® and many more
- Your logo imprinted FREE
- Call for a free catalog

Celebrating Our 25th Year!

<http://www.checksforless.com>

Call: 1-800-325-5568

Fax: 1-800-893-0177

FormSystems

72 Auburn Street
Portland, Maine 04103-2170



NetBuyer Marketplace or Intalink 508

REMOVE HARDWARE LOCKS

IT'S LEGAL

AND EASY TO DO!

Using our RIVALOCK Software

CALL FOR DETAILS!

IMAGINE THAT

2730-Q US 1 South
St. Augustine FL 32086
904-797-6600/L.O.C.K. .fax

Serious Software Licensing & Copy Protection without hardware keys or disk keys



email: info@crypkey.com
Ph: 403-258-6274
Fc: 403-258-6201

Distribute your software via Internet,
CD-ROM or floppy with full security.

CrypKey provides solid copy protection with a broad range of features to control all aspects of your product's operation. You can offer free, automatic one-time trials, turn demos into full multi-user network versions, or sell specific options by phone, fax or email. Sell usage by time, runs, features - the control is all there - easy to implement and easy to support.

Try it free from our website to see why we're rated #1 by professional programmers who seek the best combination of security, features, ease of use, reliability & price.

100% Satisfaction Guaranteed!

<http://www.crypkey.com>

NetBuyer Marketplace

The Data Recovery Experts.

Over 40,000 successful data recoveries performed.

Experts on every operating system and storage media.

Expansive data recovery clean rooms worldwide.

When it comes to recovering your critical data, bigger is better.

- Data Recovery 24 Hours A Day, Every Day
- Emergency & Critical Systems Recovery
- FREE Data Recovery Diagnostic

Ontrack.
Defining Data Recovery Solutions Worldwide

Mpls LA San Jose DC London Tokyo Stuttgart

800-872-2599

www.ontrack.com

NetBuyer Marketplace

CONVERSIONS DUPLICATIONS

TAPE 9-Track • 3480/90/90E • DLT • QIC • 8MM • 4MM

DISK CD-R • 8" • 5 1/4" • 3 1/2" • 3"

Convert DP records/fields
Convert legacy WP

IN A HURRY? data via FTP site or BBS

800-357-6250

PHONE: 317-842-2077 EXT. 300
FAX: 317-842-8294
WEB: <http://www.shaffstall.com>
E-MAIL: support@shaffstall.com

Services & Systems Sales

Since 1973 **SHAFFSTALL CORPORATION**

7901 East 88th Street
Indianapolis IN 46256

DATA RECOVERY

By Nick Majors' DATA RECOVERY LABS

Why do so many corporations, service technicians, small businesses & computer professionals insist on using Nick Majors and his team of experts for all of their emergency recovery needs? SIMPLE - We are just BETTER at what we do than anyone else in the world!

Nick Majors' DATA RECOVERY LABS

(TORONTO, CANADA / BUFFALO, NEW YORK)

The most technically successful facility available - anywhere - at any price!

Specializing in HIGH-END / TOP PRIORITY JOBS - including
Network Servers, Advanced Operating System problems,
Multi-drive RAID/ARRAY configurations, Optical Jukeboxes
and Tape / DAT recoveries

1.800.563.1167 **www.datarec.com**

NetBuyer Marketplace

DATA CONVERSION

If you want the most complete conversion services in the industry, just call...

(800) CONVERT

Capabilities include over 6000 formats
Data Recovery Services Available

**PIVAR
COMPUTING SERVICES, Inc.®**

165 Arlington Heights Rd. #M
Buffalo Grove, IL 60089
(847) 459-6010
www.pivar.com

DATA RECOVERY IN HOURS

- Over 10 years of experience with clients worldwide (HP, NASA, & FedEx).
- We've recovered more than half-a-million megabytes of lost data.
- You only pay if there's a recovery.
- Call 24-hours a day.

LAZARUS
DATA RECOVERY
Working at the speed of business.
800-341-DATA
415-435-5556 • FAX 415-495-5553 • RESTRICTIONS MAY APPLY
381 Clementina Street • San Francisco, California 94103

Tired of expensive cartridges?

Inkjet Southwest

Quality Inkjet Inks for:

• HP • Canon • Epson
• Lexmark • Apple • DEC

• Save 90% on quality Inkjet inks
Refill for 1/10th the price!!

• Factory New Compatible Inkjet Cartridges for Canon, Epson, Apple

• Save 30-50% on *laser* cartridges

Free Literature call:
1-800-447-3469
www.swlink.net/~inkjetsw

NetBuyer Marketplace

SUPPLY DEPOT INC.

Genuine Brand Toners for Less!!

All Brands Discount Prices

Copy Toners • Laser Toners
Inkjets • Fax Toners
Ribbons • MagMedia
Xerox • Canon • Ricoh
Savin • Sharp • Okidata
HP • Epson • IBM, etc.

We're one of the U.S.'s Largest Discount
Retailer of Genuine Brand Toners,
Drums, Ribbon, etc. to the Public

When You Need Toner Order Toll Free

800-331-3810

HP Laser Toner ✓ Out these Prices

New Genuine Brand Cartridges!

HP 3-Si Toner - #92291A	\$116/ea.
HP 4-4 5 5m Toner - #92298A	\$89/ea.
HP 4-V 4 My Toner - #C3900A	\$159/ea.
HP 5-L 6 L Toner - #C3906A	\$88/ea.
HP 5-P 6 P 6 MP Toner - #C3903A	\$84/ea.
HP 5-S Toner - #C3909A	\$159/ea.

118 Manton Avenue
Providence, RI 02909 FAX 401-331-3146

DATA CONVERSION

DISKS • TAPES • CARTRIDGES
CONVERSION-DUPLICATION-SCANNING

MORE FORMATS THAN ANYONE!

Quick • Reliable • Quality

WORD PROCESSORS, MINIS
MICROS, SPREADSHEETS
DATABASES, MAIL LISTS
IBM, DEC, APPLE, WANG
HP, WordPerfect, MS-Word

Lotus
Dbase
MICOM
LANIER
CPT, NBI

3480/3490, DC2120
8/4MM, XEROX, CP/M, UNIX ...

NATIONAL DATA CONVERSION
5 East 16th Street, New York, NY 10003
(212) 463-7511
AMERICA'S LEADERS IN DATA CONVERSION

THE BEST PLACE ON THE WEB TO SHOP FOR ANYTHING COMPUTER RELATED JUST GOT BETTER!

Go to www.netbuyer.com
and click on Marketplace

**NetBuyer
Marketplace**

CopyPro Load & Go!
CD & Diskette Duplicators

New! CD-R 3500XL
CD Duplicator
100 at a time!



Standalone & PC-connected from \$6495

Hi-capacity 450 CD Duplicators Available!

- Manual CD-R Duplicators from \$2995
- Floppy duplicators from \$1295
- CD-R & Diskette Media Best Prices!

Tel 510-689-1200 Fax: 510-689-1263
sales@copypro.com www.copypro.com

1-800-887-9906

NetBuyer Marketplace



DATA RECOVERY

Lost your data? Don't panic CALL!

800-886-2231

Free evaluation!

- DOS
- Windows 95 & NT
- Mac
- Novell
- Unix
- OS/2

- 24-hour
- weekend
- priority
- on-site

• Virtually all operating systems
• Competitive prices
• Clean-room facilities

DATA MECHANIX 18271 McDermott, Suite B, Irvine CA 92714
telephone: 714-263-0994 facsimile: 714-263-1549



Win95+NT, DOS, MAC
Novell, OS/2

- FLAT RATE
- NO EVALUATION FEE
- 18 YEARS EXPERIENCE
- 24 HR. SERVICE AVAILABLE
- CALL US LAST!

800-339-3412

The Fastest Turnaround! ★ ★ ★ High Quality Media!

DISKETTE DUPLICATION
Count on our Reliable, Worry-Free Service!

SOFTWARE PACKAGING SUPPLIES & FULFILLMENT
Printed Sleeves, Labels, Vinyl Pages, Mailers, Licence Agreements, Shrink Wrapping, Mailing etc.

CD-ROM MASTERING & DUPLICATION
One-off CD, Small and Large Volume duplication and Packaging

MEDIA CONVERSIONS
2500 Word Processing Formats, Disks, 9-Tracks, 3480, Colorado, QIC-80, 8mm, 4mm DAI, TK50, OCR Scanning

BLANK DISKS/CD-ROM's
Will beat any advertised price!

COMPANY COMPENDIA Inc.
1-800-374-DISK
Ph: 312-419-8771 Fax 312-419-1390

NetBuyer Marketplace or Infolink 880

CD Duplicators
CD-R, DVD-R, Media, CD Printers



HUGE SELECTION of Automatic CD Duplicators

LOW COST CD-R, DVD-R, 3.5" DISKS

FAST 24 hour CD + Diskette Duplication

MRS Multimedia Recording Systems
1-800-210-0265
610/594-1603 fax 610/594-6199

Check out our online catalog at <http://www.gomrs.com>

NetBuyer Marketplace or Infolink 661

CD-ROM DUPLICATION

COPIES AS LOW AS 79¢

- Standalone CD Duplicators
- CD Printers

Diskette Equipment

- Diskette Duplication
- CD Duplication/Replication
- Bulk Disks • Bulk CD-R's

Packaging for all your software needs
(800)426-0247

PRINCETON DISKETTE

Overnight CD-R Copies!

- UPTO 500 COPIES IN 24 HOURS
- FREE PRINTING ON DISC
- RELIABLE DUPLICATION

888 234.DISC (3472)
www.acutrack.com

- CD REPLICATIONS
- CD-R SILK SCREENING
- GRAPHIC DESIGN & FILM PRODUCTION
- PREMASTERING SERVICES

Acutrack

CD Recordable
MNL Technologies



AS LOW as \$1.20
74 Minute 650 MB Gold on Gold Discs

Lifetime Warranty

Order via the web
www.mnltech.com

888-665-2371
305-592-2449 Fax 305-507-1199

NetBuyer Marketplace



AMAZING!
Super Savings on CD-R Media & Service!

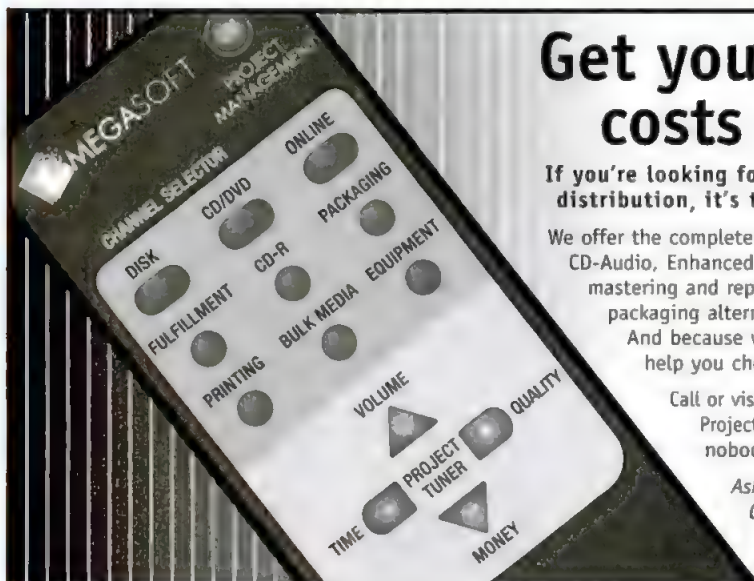
- Blank CD-R Media**
Qty. 100 - \$1.65
MTC, TDK or Verbatim
- Custom Screen Printing**
Qty. 100 - \$3.40
One Color / Includes Setup
2 & 3 Color also available
- Duplicated CD-R**
Qty. 100 - \$6.90
Copied & Verified / 1 Color Printing
"You'll Like Our Prices-
You'll Come Back for Our Service!"

DIVERSIFIED SYSTEMS GROUP, INC.
800-255-3142

Visit our Web Site: <http://dsgi.com> • e-mail: info@dsgi.com

NetBuyer Marketplace or Infolink 662

CLASSIFIED Shop NetBuyer Marketplace. Go to www.netbuyer.com. Check on Marketplace. Hundreds of ads, plus links to the Web sites of NetBuyer Marketplace advertisers.



Get your CD duplication costs under control.

If you're looking for ways to reduce costs and save time on CD distribution, it's time to change the channel. To MEGASOFT.

We offer the complete set of CD replication solutions – from CD-R to CD-ROM, CD-Audio, Enhanced CD, and DVD. We provide turnkey project management: mastering and replication, custom and on-demand printing, innovative packaging alternatives, warehousing, distribution and fulfillment.

And because we offer CD, diskette and online distribution, we can help you choose the most cost-effective combination for your projects.

Call or visit our Web site today to request an estimate or our free Project Planner. When it comes to lowering total costs, nobody else comes remotely close.

Ask about our innovative
C-Shell™ packaging for CDs.

MEGASOFT
www.megasoft.com
1-800-222-0490

**DISKETTE DUPLICATION
CD ROM REPLICATION
PRINTING • PACKAGING
WAREHOUSING
DISTRIBUTION**

Floppy Copy
INCORPORATED
Integrated Software Services

3822 WEST 1987 SOUTH • SALT LAKE CITY, UTAH 84104
801-975-9411 • FAX 801-975-9394 • 1-800-732-3475

**AUTOMATIC
DUPLICATION EQUIPMENT**

For:

- CD-R
- Diskettes
- HDD
- PCMCIA

Floppy & CD-R
Printers, too!

Floppy Standalones
from \$1695

CD-R Standalones
from \$5495

**OVER
13,000 UNITS
INSTALLED
WORLDWIDE!**

888-723-3475
510-373-6060
championsms.com

CHAMPION

CD-R & DISK DUPLICATORS

•CD-R Duplicators From **\$1995**

•Disk Duplicators From **\$1594**

•CD-R Media

•CD-R & Disk Duplication

T.S. Solutions

1-888-276-7992
Tel: 510-371-4650 Fax: 510-371-4694
http://www.ts-solutions.com
e-mail: tsol@aol.com

NetBuyer Marketplace

**NOW THAT
YOU'RE
MAKING YOUR
OWN CDs...**

**HOW DO YOU
LABEL
THE DARN
THINGS?**

**WHITE,
CLEAR,
COLORED &
METALLIC
LABELS**

**JEWEL CASE
INSERTS TOO!**

• DESIGN • PRINT • APPLY • PACKAGE
PRODUCE PROFESSIONAL-LOOKING CD LABELS
& JEWEL CASE INSERTS FOR **\$79.95 PRO-PAK**

NEATO LLC
USA: 250 Dodge Ave • East Haven, CT 06512
203-466-5170 • Fax 203-466-5178 • 800-984-9800
Europe: +44 (0)990 561571 • Fax +44 (0)181 932 0480
Mastercard • AMEX • VISA www.neato.com

**Got WEBPAGES ???!!!
GET
ThumbIt!
TODAY!**

The powerful image resizing and
converting tool from Medianet, the
folks who know what it takes to put
together a great web site!

ThumbIt Features:

- Image Resizing
- Image Converting
- Aspect Ratio Preservation
- Batch Mode Operation
- Easy Wizard Style Interface

Give ThumbIt a test drive today!

FREE DOWNLOAD!
webtoolshack.com

**MARKETPLACE
READERS ARE
BUYERS. 57%
OF THEM BOUGHT
HARDWARE FROM
A MARKETPLACE
AD IN THE LAST
12 MONTHS.**

**ADVERTISE HERE,
WHERE BRAND
SPECIFIERS BUY
DIRECT! CALL
800-825-4237
TODAY!**

Source: 1997 PC Magazine Marketplace Subscriber Study

THESE ADS
ATTRACT BUYERS
WHO BUY AGAIN
AND AGAIN!
ON AVERAGE,
THEY BOUGHT
12 DIFFERENT
TYPES OF
PRODUCTS
MORE THAN
ONCE FROM
MARKETPLACE
ADS IN THE LAST
12 MONTHS.

ADVERTISE
HERE, WHERE
BRAND
SPECIFIERS BUY
DIRECT! CALL
800-825-4237
TODAY!

www.redbutterfly.com

FOR THE
HARDEST
HARDCORE ON
THE NET

TAKE A RIDE ON THE BUTTERFLY

www.redbutterfly.com
Memberships for \$2.49 a day!

Super Intro Deal!
\$19.95 for 6 Months Unlimited!

Memberships include:
Free Live Girls!
Free Video Streaming!
All Nude Celebrities!

For The Discriminating
Patron of Adult Entertainment
Must be 18 or older.

www.redbutterfly.com

HOT! NEW! FREE!
Totally **FREE** Sex Online

Visit us at: <http://www.>

FREE highsocietymag.com/pm
All-sex, all-celebrity highlights

FREE amateurarcade.com/pm
The net's finest newcomers

FREE nude-n-natural.com/pm
Just 18 and eager to please!

FREE fullthrust.com/pm
The web's hottest couples get hot!

FREE planetlesbo.com/pm
Out-of-this-world lesbians

FREE babesunlimited.com/pm
The internet's most gorgeous girls

FREE hotnudemen.com/pm
The hottest all male site on the web

FREE hollywoodheat.com/pm
Tinsel town's starlets exposed

FREE ygal.com/pm
Young, sweet ladies for the asking

www.cun-tv.com
TOTALLY LIVE, TOTALLY NUDE
Must be 18 or Over

BIZAR

THE WIERDEST SEX ONLINE

- THOUSANDS OF BARE, UNCENSORED HOT WEIRD PICTURES: SM, BB, BVL, FITTH AND MORE!
- EXTREME ONLINE VIDEOS FROM EUROPEAN PRODUCERS.
- FREE DATING AREA.

www.bizar.com

HOT & Heavy

100% UNCENSORED FROM AMSTERDAM

FREE LIVE NUDE Video Sex

We have it all!

100000+ Hot Pictures - 1000+ Heavy Gals Video
International Duty Free - Sex Superstore - VHS/DVD Pictures - Rotor

www.hb.nl
adults only 18+

MARKETPLACE SHOPPERS HAVE THE
CONFIDENCE AND COMPUTER SAVVY TO
PURCHASE DIRECT FROM YOUR AD. OVER
SIX OUT OF TEN BOUGHT FROM
MARKETPLACE ADS IN THE LAST 12
MONTHS.

- 57% BOUGHT HARDWARE.
- 47% BOUGHT SOFTWARE.
- 43% BOUGHT SUPPLIES OR SERVICES.

ADVERTISE HERE,
WHERE BRAND SPECIFIERS
BUY DIRECT! CALL
800-825-4237 TODAY!

BABYLONX
LIMITED OFFER!

FREE 1 week membership!

HARDCORE BEDROOM POLAROID
SNEAKY PAPAZZI SHOTS!

- MADONNA HARDCORE SHOW!
- PRINCESS DIANA BARES ALL!
- PAMELA ANDERSON XXX VIDEO AND STILLS!
- AGENT SCULLY'S PINK GULLY!
- CINDY CRAWFORD,
- BARRA STREISAND!

Don't miss out - get in NOW!

School Girl Strip
+200 hardcore video feeds!
LIVE IN YOUR BROWSER!

www.babylon-x.com
ADULTS ONLY - MUST BE 21 YEARS OR OLDER

Be Set Free

We offer all of the items on our web site at **NO COST** to those seeking to be set free from their sexual addictions and temptations. These items are designed to lead you to a better understanding of God, and the freedom He offers to all who seek Him.

The Branches of Life
www.nilenet.com/~branches

PC Magazine's BusinessCard section is a forum for innovative, hard-to-find and low-cost PC products and services. Ads are listed by product category.

RATES:

1 issue—\$1,145, 3 issues—\$1,000,
6 issues—\$970, 12 issues—\$920,
17 issues—\$865, 22 issues—\$855
Multiple-ad per issue rates also available.
Prepayment must accompany each insertion.
VISA/MC welcomed.

AD FORMAT:

PC Magazine will typeset each BusinessCard ad. Advertisers should furnish typewritten copy. Ads include: 1) Headline (1 line, initial caps=30 characters max, all caps=25 characters max), 2) Descriptive copy (5 lines, 225 characters max), 3) Company name (same specifications as headline), and 4) Address and telephone number (2 lines, 40 characters per line). No logos, art-work or camera-ready ads. Publisher reserves the right to edit supplied copy to meet section specifications.

DEADLINES:

PC Magazine is published 22 times a year, (bimonthly except for July and August). The BusinessCard closing is approximately two months prior to issue date.

Please send copy and payment to:

PC Magazine BusinessCard
One Park Avenue, 3rd Floor
New York, NY 10016

For more information, call 800-825-4237
or 212-503-5115, FAX: 212-503-5860.

SOFTWARE/DATA ENTRY

The Data Entry Emulator™

Full featured, heads-down data entry with two-pass verification, edit language, output record reformat, operator statistics, batch control, on-line help, free tech support, key from images (NEW!).
For PC, PC LAN, S/38, or AS/400.

Computer Keyes

21929 Makah Road, Woodway, WA 98020
800-356-0203/425-776-6443/Fax: 425-776-7210

Hand Your Business Card...

To 1,044,227 of the most qualified buyers in the PC market. These brand-specifiers are looking to buy while reading the industry's #1 publication. There is no more cost-effective or efficient way for you to build sales.

BusinessCard

Call your BusinessCard representative today.
1-800-825-4237

We Make It So Easy—

Leave your business card with us and we'll do the rest. PC Magazine will create your BusinessCard for you. It's so easy—and so very effective.

BusinessCard

Call your BusinessCard representative today.
1-800-825-4237

INTERNET TOOLS/UTILITIES

DNEWS - Internet News/Forum Server

Provide the fastest access to Internet news.
Provide local news/discussion groups - the new vehicle for internal communications. Download DNEWS NOW and experience performance.

NetWin Ltd

<http://netwinsite.com>
netwin@netwinsite.com

STATISTICAL/RESEARCH

The Survey System for Windows

Analyzes: marketing, public opinion, customer satisfaction, employee attitude surveys. Handles mail, personal, phone, scanner, disk-by-mail, computer interviews. Records verbatim text/voice answers. Powerful, flexible, user friendly. Free support.

Creative Research Systems

140 Vista View #100, Petaluma, CA 94952-4728
Ph: (707) 765-1001/Fax (707) 765-1068
www.surveysystem.com

ENTRANCE/COMPUTER INSURANCE

Insures Your Computer

The COMPUTEROWNERS™ insurance policy repairs or replaces hardware, media and purchased software. Rates as low as \$49 a year covers theft, fire, accidents, power surge and more! Call for immediate coverage or info. 1-900-800-1492.

Safeware, The Insurance Agency Inc.

5760 N. High Street P.O. Box 656
Columbus, OH. 43085

NetBuyer Marketplace

Location: <http://www.netbuyer.com>

SHOP THE WEB

at NetBuyer Marketplace, a
searchable database of hundreds of ads
for everything computer related.

Go to www.netbuyer.com and click on Marketplace



Marketplace



Online Reader Service/Free Product Information

Want to learn more about a company or product you see in PC Magazine?
Go to www.pcmag.com/infolink

From there, you can select a product category, company name or InfoLink number. Then choose to get your information via phone, mail or e-mail. You can even link directly to a vendor's website.

from
PC MAGAZINE
www.pcmag.com/infolink



ADVERTISERS' INDEX BY COMPANY

InfoLink No.	Advertiser	Page	InfoLink No.	Advertiser	Page	InfoLink No.	Advertiser	Page
*	3 Com Corporation	185	*	Digital Equipment Corp.	122-123	047	PC Connection	290-291
*	3 Com Corporation	194-195	004	Epson America	12-13	330	PC Mall	278-279
*	3 Com Corporation	207	104	Gateway 2000	36A-H,37	080	PC Power & Cooling Systems	88
007	3M Visual Systems Division	72	099	Gateway 2000	109-115	068	PC Zone	280
100	ABIT Computer Corp.	247,248	200	GigaByte Technology	265	209	Panda Software	228
030	A.T. Cross Company	20	*	Hewlett Packard	169	*	Pantone Inc.	240
101	ATI Technologies	8	184	iiyama Direct	44	014	Paragon Memory	281
087	Acer America	57	084	iiyama North America	86	021	Philips Business Electronics	243-245
*	Adobe Systems Inc.	177	*	Imation	18-19	293	Play Inc.	329
108	Akia	172	171	Innovative Software	167	176	PowerQuest Corp.	96
162	American Power Conversion	138A-H	278	Insight	95	173	Premio Computers	78
342	American Power Conversion	323	*	Intel Corporation	40-41	031	Princeton Graphics Systems	62-63
062	Amertek	200	*	Intel Corporation	223	287	ProGen	98-99
*	Anthro Corporation	24	*	Iomega Corporation	129	383	Puma Technology Inc.	231
212	AOpen Inc.	263	*	Iomega Corporation	131	024	QMS	227
113	ArcSoft	321	295	J&R Computer World	270-271	074	Quantex	117-119
336	Arlington Computer Products	232	106	Kingston Technology Corporation	53	127	Ringdale	213
218	Asustek Computer Inc.	253-255	019	L.A. Trade	285	309	S.A.G./Storage Solutions	32-33
*	Autodesk Inc.	181	094	Lexmark International Inc.	155	033	SMC	216
172	Avatar Peripherals	327	380	Matrox Graphics Inc.	92	*	SPSS, Inc.	234
355	Axis Communications	220	201	Maximizer Technologies	237	247	STB, Inc.	318
*	Compaq Computer Corporation	151	191	Meridian Data	208-209	*	Samsung Electronics	34
228	CompUSA PC	198	027	Micro Solutions Computer Products	284	374	Seagate Software NSMG	205
198	CompUSA Direct	286-287	003	Micro Warehouse	282-283	227	Shamrock Technology Co., Ltd	257
199	CompUSA Direct	288	120	Micron Electronics	FLAP-B	229	Silicon Integrated Systems	260
348	Computer Associates	215	013	Micron Electronics	15	*	Sony Computer Products	159
360	COMPUTER DISCOUNT WAREHOUSE	69	098	Micron Electronics	16-17	073	South Hills Datacomm	212
159	COMPUTER DISCOUNT WAREHOUSE	70-71	164	Micron Electronics	48A-N	057	Statsoft	43
133	COMPUTER DISCOUNT WAREHOUSE	224-225	*	Microsoft	C2-C4,p.1	023	Sun Microsystems	5
158	COMPUTER DISCOUNT WAREHOUSE	273	*	Microsoft	22-23	335	Sun Microsystems	105
109	COMPUTER DISCOUNT WAREHOUSE	274-275	*	Microsoft	50-51	*	Symantec Corporation	187
332	Corel Corporation	191	*	Microsoft	74-75	*	Symantec Corporation	226
197	Corex Technologies	94	*	Microsoft	126-127	315	Syquest Technology	25
203	Crucial Technology	65	*	Microsoft	143	066	TigerDirect	333
051	Data Comm Warehouse	219	245	Microstar International	258-259	377	Toshiba	26-27
*	Dell Computer Corporation	C5-C8	036	Mitac International	250-251	242	UMAX Technology	147
*	Dell Computer Corporation	58-59	156	NEC Computer Systems	2-3	241	UMAX Technology	149
*	Dell Computer Corporation	66-67	155	NEC Computer Systems	80-81	222	Videonics	325
*	Dell Computer Corporation	90-91	154	NEC Computer Systems	82-83	298	ViewSonic	84
*	Dell Computer Corporation	102	157	NEC Technologies	144-145	206	Web Communications	211
*	Dell Computer Corporation	136-137	153	NEC Technologies	165	085	Winbook	77
*	Dell Computer Corporation	161	299	Network Associates	153	*	ZD Comdex & Forums	292
*	Dell Computer Corporation	289	*	Nokia	54-55	*	ZD Net	266
*	Diamond Multimedia Systems	31	118	Optiquest	179	*	ZD-TV	267
*	Diamond Multimedia Systems	193	*	Oracle Corp.	11	* No InfoLink#. Please Call Advertiser For More Information.		

After Hours

Memorable Mail

Sending e-mail, complete with video and audio clips, is affordable and fun.

By Bruce Brown

To send personal messages to family and friends, try video e-mail. Less expensive and more convenient than video teleconferencing, video e-mail requires only a PC video camera or camcorder, an e-mail account, and messaging software to produce. It doesn't require a fast modem connection or having both the sender and the recipient online at the same time.

Video e-mail products send embedded players with the messages so that recipients can play them back immediately. Whether you're sending birthday wishes to Grandpa or a "study hard" message to your daughter in college, video makes e-mail warmer and more effective.

Alaris QuickVideo Transport

Video quality from tiny computer cameras can be iffy, but the ability to use a camcorder or capture video clips from a VCR lets you create

much higher-quality images for your e-mail. The Alaris QuickVideo Transport, an external video capture device, can use any video source with an RCA or SVHS (S-video) jack for video input. A separate PC video camera costs \$189 street.

You don't have to open your PC to install the QuickVideo Transport: It simply

plugs into an ECP parallel port—great for notebook computers. The downside is that you can't use the same port for printing. The QuickVideo Transport is powered via a keyboard pass-through connector; adapters are included.

The ten-page, black-and-white quick-start guide provides basic instructions. Its clear line drawings are augmented by an online user guide.

With its familiar buttons and simple menus, the QuickVideo Transport's interface resembles a VCR control panel. Before you record your Videogram, a test pattern lets you check image quality and a countdown timer gives you time to compose yourself.

After you record, you can insert a message title and background music; you can also

fine-tune video and audio characteristics. You can adjust frames per second and audio quality; such choices affect the overall size and quality of your message.

The QuickVideo Transport lets you import WAV files to add music to your message. Another option lets you export the mail file as an AVI file, allowing recipients with AVI playback software to read the e-mail.

Video e-mail is only one component of the QuickVideo Transport. Other features include videoconferencing with VDONet's CDOPhone Direct, still-image capture and editing, and image manipulation with LivePicture's LivePix, Gryphon Morph, and Asymetrix's Digital Video Producer.

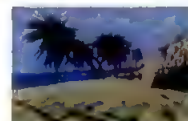
CVideo-Mail

Ease in setup is a great confidence builder. Hence CVideo-Mail gets a top rating thanks to its installation video and 122-page user manual with color photos and

INSIDE

BEYOND TIME

Travel through centuries past to find clues that will help you save the future of mankind. *Page 324.*

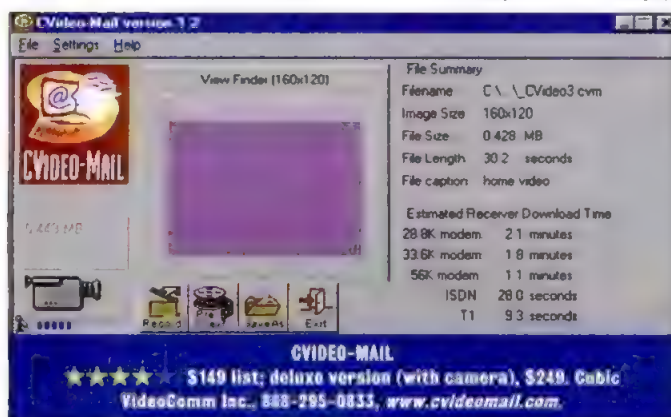
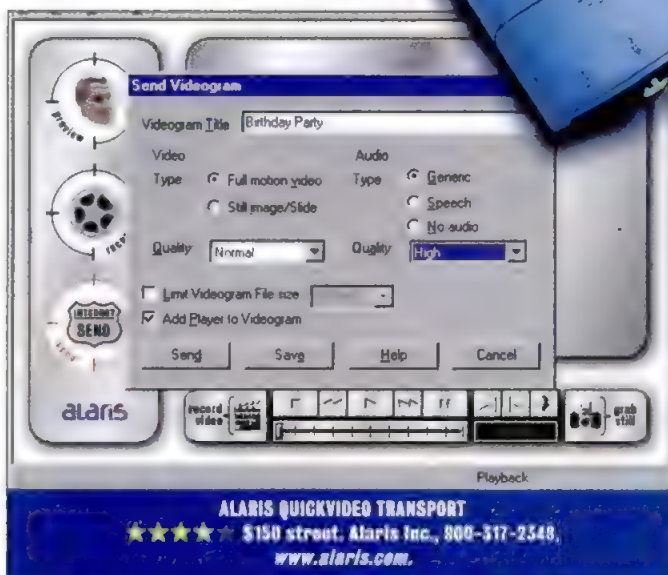


IMPROVED SPACE COMBAT

Become a Rebel or Imperial pilot in the X-Wing vs. TIE Fighter expansion pack. *Page 324.*

EVOLUTION

Is this strategy game a step forward or an evolutionary mishap? *Page 326.*



After Hours

screenshots. The manual also has tips on camera placement, lighting, and background.

The basic CVideo-Mail package consists of a video capture card, software, and Qualcomm's Internet-based e-mail program Eudora Pro. Although CVideo-Mail comes with Eudora Pro, it is MAPI-compliant and automatically integrates with most e-mail clients. The deluxe version adds a compact Philips camera to the basic package. It also includes a camcorder adapter so that you can capture video from a camcorder or VCR.

We found both the hardware and software easy to install; just be sure you have a free PCI slot in your PC for the video capture card. The small camera in the deluxe package adequately captures two people in the frame; buttons on the camera's back adjust white balance and contrast. Within 10 minutes we were creating test messages.

Three options provide the recipient of your video e-mail with the required 79K player. The first and most user-friendly one embeds the player with the message so that the receiver downloads a single attachment. The second separates the message and the player into two attachments; it's the recommended approach for America Online users (though a single attachment worked fine in testing). If the message is not sent with the player embedded, the recipient can download it from Cubic VideoComm's Web site; the process is only a minor annoyance.

CVideo-Mail uses a proprietary file format and has an

Video E-Mail Packages

	Alaris QuickVideo Transport	CVideo Mail	VideoLink Mail 2.0	WorldConnect VisualMail Home/Office Kit
Price	\$150 street	\$149 list, Deluxe version (with camera), \$249 list	\$30 street	\$299 list; software and video capture card, \$199 list; software only, \$60 list
Minimum system requirements	Pentium PC with 16MB RAM, Windows 95	Pentium PC with 16MB RAM, Windows 95, 1 free PCI slot	Windows 95, 8MB RAM	Windows 95, 1 free ISA slot
Captures video from PC camera/camcorder/VCR	✓✓✓	✓✓✓	✓✓✓	✓✓✓
Includes PC camera	✗	✓ (Deluxe version only)	✗	✓
Includes video capture device	✓	✗	✗	✓
Capture device interface	Parallel port	PCI slot	N/A	ISA slot
Offers AVI file support	✓ (export only)	✗	✓ (import only)	✓
Other software included	Asymetrix Digital Video Producer, Gryphon Morph, Live Picture LivePix, VDDPhone	Eudora Pro 4.0	None	NetMeeting, NetShow, Xtreme Web Theatre Client
Adjustable frame rate/size	✓✓	✓✓	✗✓	✓✓
Adjustable image quality	✓	✓	✓	✓
N/A—Not applicable. The product does not have this feature.				

unexciting interface, but ease of installation and fine video and audio quality make it a winner.

VideoLink Mail

Since VideoLink Mail 2.0 is a software-only product, its price is a low \$30 (street), but you need a video

capture card and a video input device, such as a camcorder or camera, to use the program.

VideoLink Mail's interface is its best feature. Installation is entirely automatic. This is helpful, because during our testing neither a quick-start guide nor user documentation was available. (Both are in production and will be included in future versions of the product.) But since the program installs quite easily and recognizes available video capture devices, the lack of documentation didn't slow us down a bit. In a very short time we were creating video e-mail messages.

The most impressive feature of this product is its screen layout, which makes the program a delight to use. The control panel, which looks three-dimensional, is attractively designed and has clearly labeled

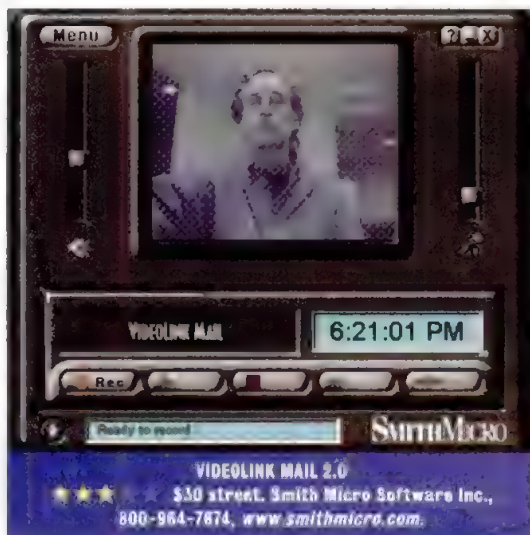
buttons. For greater convenience, at the touch of a key the bottom portion of the control panel scrolls up behind the

video screen, where it takes up less space.

When we used the video capture card and camera from the CVideo package, the video quality of VideoLink's video e-mails was acceptable, but the program is pickier with audio input. The camera's small microphone resulted in scratchy audio. Switching to an inexpensive Microsoft boom-style microphone rectified the problem.

Image quality and video recording speed are adjustable, and you can preview the message file size with or without the embedded player. VideoLink Mail also has the ability to import AVI files; this creates flexibility in designing video e-mail messages by allowing you to use content from Web sites or other video clips.

Because of its smooth, intuitive interface and ease of installation and use, VideoLink Mail competes effectively with comparable video e-mail products. But a package with a capture card and camera would be a welcome addition to the product line.



capture card and a video input device, such as a camcorder or camera, to use the program. VideoLink Mail's interface is

CAPTURE STILL IMAGES and MOTION VIDEO

ZIPSHOT FOR PARALLEL PORT



Capture high-quality, high-resolution digital still images and video direct from any video source.



digital camera



camcorder



VCR & TV



"Zipshot is a great low-cost entry into digital photography. Snappy...is more expensive and not as easy to use."



ZIPSHOT FOR PCMCIA PORT



PARALLEL PORT

The best parallel port still image and video capture device available.

- Easy parallel port installation featuring printer pass-through
- No batteries or electrical outlet required

PCMCIA PORT

The first still image and video capture solution designed specifically for your notebook.

- Full-motion video capture (30 fr/sec) at 640x480 pixels
- Zoomed video technology

ZIPSHOT FEATURES INCLUDE

- Rapid 2 second capture cycle. With other capture devices, you have to wait up to 30 seconds between captures. (Translation: Capture more, rewind less.)
- Speedy download time from your digital camera of only 1 sec/fr. (That's 10 times faster than standard serial port transmissions.)
- Real-time color preview and color adjustment.
- Video and S-Video support in a single device.
- NTSC, SECAM and PAL support.
- TWAIN-compliance
- Fully-integrated software for image editing, image entertainment, multimedia email, video conferencing and more...(valued at over \$300)

FOUR WAYS TO CAPTURE

- Still Image capture - You get high-quality, high-resolution images (1600x1200 pixels) from any video source.
- Continuous capture - Get the shot you want - the first time you try. With Zipshot, you can take up to 8 sequential still images with a single click.
- Time-Elapse capture - Turn your camcorder or digital camera into an automatic surveillance device. Take up to 10 fr/min for a maximum of 24 hours.
- Motion Video capture - Capture video (AVI) with sound.

ZIPSHOT®

Available at Sears, Circuit City, Fry's Electronics and many other fine retailers

Check out: www.zipshot.com
Or Call: 1.800.762.8657



After Hours

WorldConnect VisualMail Home/Office Kit

At \$299 (list), the VisualMail Home/Office Kit is the most expensive of the tested packages, but it also comes with the most complete set of components. The bundle includes an ISA video capture card that doubles as an audio card and has inputs for composite video, S-video, and the kit's PC camera.

If you already have a video capture card and camera, you can buy only the software for \$60. The company also bundles the software with a video capture card (\$199) to use with a camcorder. Installation proved a little tricky, but once everything was in place, the VisualMail Kit was extremely easy to use and adjust.

rate installation routine. According to the company, the next version will have all the software on a CD-ROM, with a single installation program.

Once the components were installed, it was a breeze to use the recorder-style buttons to record, stop, play back, and save video mail clips. A comprehensive image-adjustment screen makes it easy to select the image size, frames per second, and compression ratio. Adjusting brightness, contrast,



The VisualMail Kit's video capture card and camera are made by Winov. Currently, the hardware installation software comes on a CD-ROM, while video e-mail software comes on floppy disks—each with a sepa-

rate installation routine. According to the company, the next version will have all the software on a CD-ROM, with a single installation program. Once the components were installed, it was a breeze to use the recorder-style buttons to record, stop, play back, and save video mail clips. A comprehensive image-adjustment screen makes it easy to select the image size, frames per second, and compression ratio. Adjusting brightness, contrast,

saturation, and hue is made easier by instant feedback from a real-time image.

As with the other products we tested, you can send video messages easily via MAPI-compliant e-mail programs or as attachments with non-MAPI software, such as America Online's mail program. When you play back a message, however, a VisualMail banner displays first, and then the company's phone number is displayed in bold numbers just above the video clip plays. All of the tested products tag the video e-mail with company information, but this is the most intrusive instance of the practice.

Complete Video Packages

In addition to products intended specifically for video e-mail, there are packages that perform more extensive video and communication functions. We looked at good choices from Creative Labs, Eastman Kodak Co., and Intel Corp. These products each include a digital video camera as well as photo-editing software. They are designed for videoconferencing, capturing video clips for posting on the Internet, and advanced image manipulation.



The Creative Labs Video Blaster WebCam II (\$99.99 list) can send live video clips or still images over the Internet for viewing in presentations, in e-mail, or on Web sites. It consists of a digital color video camera, a parallel-port adapter, a keyboard power cable, and a Plantronics headset microphone/earpiece for audio conferencing and videoconferencing. No video capture card or external power supply is needed, so you don't have to open your computer case. Bundled with a good selection of video capture, editing, and transmission software, the Video Blaster WebCam II is best for creating and integrating live video on Web sites and is a highly sophisticated solution for video e-mail. (Creative Labs, 800-998-5227, www.creative-labs.com.)

There are three versions of the Intel Create & Share Camera Pack: a USB version that needs no video capture card (\$199 list), a PCI video capture card (\$299 list), and a PCI modem version (\$399 list). Each comes with a digital camera and is great for capturing, enhancing, and editing photos and video clips and transmitting them over the Internet. Intel also bundles a healthy amount of software for working with your images, notably Kai's Power GOO SE for image morphing and Intel's VideoPhone. Create & Share is best if you want to manipulate photos and videos, and teleconference. (Intel Corp., 800-548-4725, www.intel.com.)

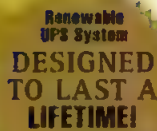


The Kodak Digital Science DVC323 Digital Video Camera (\$169 list) shoots 640-by-480 color stills and full-motion videos. It plugs into a USB port and doesn't require a video capture card. The USB interface supports speedy, uncompressed image transmission and offers plug-and-play convenience. The software bundle, which takes advantage of both the video and still functions of the camera, includes PictureWorks Live multimedia software and Kodak's Picture Easy to help you enhance, edit, organize, and e-mail video and stills. Kai's Power GOO SE is also included for more creative editing. (Eastman Kodak Co., 888-375-6325, www.kodak.com.)



—Bruce Brown

**The world's
best-selling UPSs
now start at \$99**



(888) 288-APCC x8303 • FAX: (401) 788-2797

Zone

132 Faber-Castell Road, Westborough, MA 01581, USA

Visit us at **Gomden Spring**
8:00 am - 5:00 pm

Time Travelers

Solve this game's mystery before time runs out—permanently.

Beyond Time

Someone is stealing the world's art treasures. In *Beyond Time*, raiders from the future have traveled back in time to steal priceless historical artifacts. Even worse, their travels are damaging the fabric of time itself. Only by voyaging far into the past can you stop them.

Beyond Time begins at an archaeological site in present-day Egypt, where a sculpture that had disappeared from a museum has just mysteriously

reappeared. You've barely begun your exploration of the grounds when a statue of Osiris transports you to ancient times. As you wander through a temple, visions of gods appear and

offer helpful hints.

The first half of the game doesn't have much to do with time travel, but it sets up the second half. Scrolls in the temple library provide

pieces of information about Egyptian mythology that you need for solving puzzles later on.

Your first big goal is to cross the river, then get into the labyrinth underneath the Great Pyramid—the home base of the time raiders' crew. Here you

find some of their power crystals, as well as clues to help you destroy their time machine.

You also find the crew's personal quarters, where you can watch their video diaries. This

was our favorite part of the game, because the crew is played by unknown young actors. As their characters' missions go awry, they act more and more desperate, complete with wide eyes and hair standing on end.

When you've gathered enough information, you get to do more time travel and visit outposts in Atlantis, Tibet, the land of the Mayans, and a futuristic space station to find the remaining crystals. If you get that far, you're probably pretty savvy, because *Beyond Time* is full of tricky puzzles that require patience and observation to solve.

Though *Beyond Time* is a bit on the dry side and more than a bit cheesy, the game makes for good play. It gets its mythology right, which is rare, and always respects the player's intelligence.—*Troy Dreier*



Better Late than Never

The X-Wing vs. TIE Fighter expansion pack adds on great gaming features.

X-Wing vs. TIE Fighter: Balance of Power

Despite breakthrough graphics and solid game play, LucasArts Entertainment Co.'s *X-Wing vs. TIE Fighter* has some notable shortcomings. Because the game was designed as a multiplayer title, single-player features are skimpy. Worse, *X-Wing vs. TIE Fighter* suffers from poor performance over the Internet—its primary medium. Though the *Balance of Power* expansion pack took nearly eight months to deliver, this supplement finally addresses both of these issues.

Balance of Power requires

you to have the original *X-Wing vs. TIE Fighter* game. System requirements for this Windows 95 game include a Pentium/90 with 16MB of RAM. For best results, however, we recommend using a Pentium/166 with 32MB of RAM and a 3Dfx graphics board.

Balance of Power's most important features are the two full-fledged single-player campaigns, one each for Rebel and Imperial pilots. Each campaign comprises 15 missions and includes 3 beautifully rendered cinematic scenes. The



campaigns are well designed and challenging, though a few of the missions may prove too tough for novice pilots. Fortunately, the game offers four difficulty levels and a few cheats.

Fans of the original *X-Wing vs. TIE Fighter* game will be happy to note that *Balance of Power* includes the powerful B-Wing starfighter. The enormous Super Star

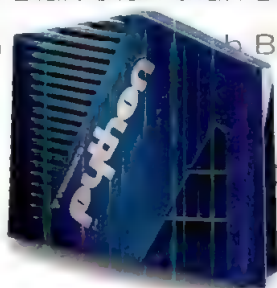
Destroyer also makes an appearance as a challenging target in the Rebel campaign.

Eight new multiplayer combat missions have been added, as well as two new melee scenarios. Additionally, multiplayer performance has been improved, though the game can still feel choppy over the Internet. Also, in the original game, when two or

more players flew a mission against the computer, the game would enhance the artificial intelligence to make the mission much more difficult. In *Balance of Power*, you can (finally) turn this feature off.

For *Star Wars* fans especially, all the new spacecraft, missions, and game play improvements are worth the upgrade.—*Michael E. Ryan*



[illegible]

video and digital snapshots by e-mail. Instead of the usual text-only snooze-fest, your message will grab people by the lapels and give them a good shake. The only limit is your fertile imagination. _____

And Python lets you add video to your web pages or multimedia presentations. It's even bundled with \$1,000 worth of cool software, absolutely free.

Best of all, it hooks up in minutes. Call us at 1-800-338-EDIT for a retailer near you. Get Python and start getting noticed.



VIDEONICS

fray's ELECTRONICS

**WOLF
CAMERA**

1370 Dell Avenue,
Campbell, CA 95008
1-800-338-3348
FX: 408-866-4859

WWW.VIDEONICS.COM

Choose 222 at www.pcmag.com/infolink

After Hours

Growing Pains

Create and develop your own species in the strategy game Evolution.

Evolution

When you're playing a strategy game that measures time in hundreds of millions of years, you don't want the game to feel as if it's taking hundred of millions of years. But despite an intriguing premise and nice production values, Evolution is mired in a clumsy interface and slow game play.

Essentially, Evolution takes a strategy game and transfers the conflict from the battlefield to the realm of natural selection. Instead of using tanks and soldiers, the players fight by creating animals—amphibians, reptiles, dinosaurs, or mam-

mals. The concept is a great way to break away from the usual "amass resources, kill people" real-time nexus.

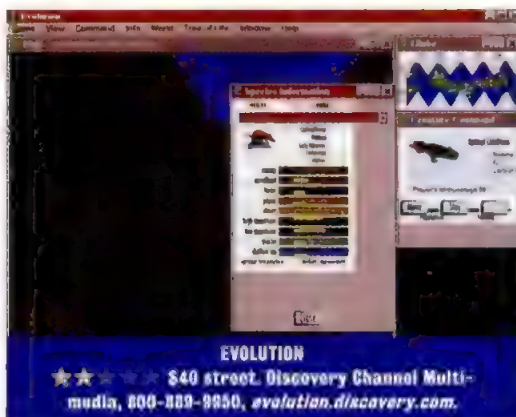
You can play against the computer or against up to six other players over the Internet. Each player creates animals that compete for feeding territory and for the evolutionary dominance of their clade, or group of creatures. The game's interface combines a top-down map overview with a series of life trees, control

boxes, and creature screens. By allotting resources to create new creatures, improve feeding, and enhance combat, you can strengthen your animals and determine which creatures

very sophisticated model of interrelationships is at work in charting evolution, geology, and habitat, but managing all of these weighty concepts can be tedious and cumbersome.

Rather than distilling the complex controls into a fluid interface, the bewildering variety of screens makes for maximum confusion. And during network play, too much time is spent waiting for decisions to take effect or be rendered moot by the actions of other players. Since Internet games can't be saved while in progress, this means marathon sessions for head-to-head play.

In a way, you might say the game is akin to a platypus: interesting to ponder but ultimately an evolutionary cul-de-sac.—*T. Liam McDonald*



evolve next. The trick is to choose the creatures that best fit the changing landscape by selecting those with complementary properties.

There is no question that a

SAVE ON



GO TO

<http://subscribe.pcmag.com/free>

and get 22 Issues a year plus a FREE Bonus Gift!

COVER YOUR ASSETS.

**PORTABLE COMPUTER USERS –
ONLY SHARK 250™ IS SMALL AND
MOBILE ENOUGH TO PROTECT
ALL YOUR DATA ALL THE TIME –
EVEN ON THE ROAD.**

Cover all your assets with the only mobile hard drive designed specifically for notebooks: the Shark 250. It's the only removable drive that doesn't require an external power supply, making it the only drive that's convenient to use on the road. It all runs on a single cable. The same drive works on both your notebook and desktop PC with just a quick change of the cable. Because the Shark 250 gives you both parallel port and PC card compatibility, you can swap data between notebook and desktop without a hitch.

9.7 ounces.
No external power supply.
The only true "on-the-fly"
mobile hard drive.

What's more, the Shark 250 weighs just 9.7 ounces, is fast enough to back-up your data instantly and run full-blown multimedia applications – on a drive that fits in your shirt pocket. The Shark 250 gives you 250 MB of extra space on each 2.5" removable HARDiskette. Find out why Shark 250 is endorsed by Compaq, Dell, Digital, Unisys and others. Get a Shark 250 to cover your assets before you hit the road.

To get a Shark of your own, contact your local retailer. For more information call **1-888-GO-AVATAR** (1-888-462-8282) code PCM03, or visit us at **www.goavatar.com**

Get your own Shark 250 for under \$200 at CompUSA, Fry's, Computer City, Egghead, Future Shop, Micro Center, MicroWAREHOUSE, Tiger, Staples, CDW, COMPUCENTRE, Business Depot, Micro Home Computing and CompuSmart. Available in Shark 250 Pro, PC Card and Parallel Port versions.

AVATAR
PERIPHERALS, INC.



Shark

250
MOBILE
HARD DRIVE

SHARK YOUR PORTABLE!

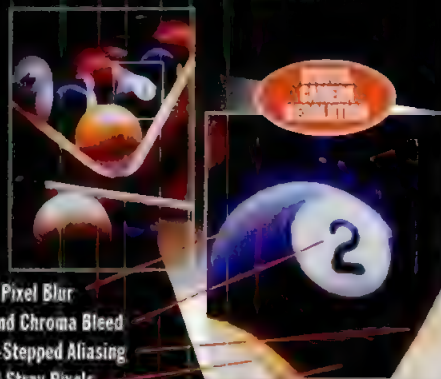
© 1998 Avatar Peripherals, Inc.* Shark 250 and HARDiskette are trademarks of Avatar Peripherals, Inc. All other names and trademarks are the property of their respective owners.

Choose 172 at www.pcmag.com/infolink

Product Company	Page No./Infolink	Product Company	Page No./Infolink
Ascend Pipeline 75 Ascend Communications Inc.....	184/503	Lexmark Optra S1255n Lexmark International Inc.....	148/525
BackOffice Server 4.0 Microsoft Corp.	60/404	Lexmark Optra S1625n Lexmark International Inc.....	148/525
Bay Networks Nautica Bay Networks Inc.	188/504	Lexmark Optra S1855n Lexmark International Inc.....	148/525
Brother HL-2400CN Brother International Corp.	160/521	Lexmark Optra S2455n Lexmark International Inc.....	148/525
Canon GP-200F Canon U.S.A. Inc., Networked Office Systems Division.....	138/522	Lexmark Optra SC1275n Lexmark International Inc.	162/525
Cisco 766 Cisco Systems Inc.....	192/505	Micron Millennia Xi 400 Micron Electronics Inc.....	128/541
Cisco Networked Office Stack Cisco Systems Inc.	204/911	Minolta PageWorks 12 Minolta Corp., Peripheral Products Division.....	150/526
Compaq Deskpro EP Series, Small Business Solutions Compaq Computer Corp.....	116/	Minolta PageWorks 20 Minolta Corp., Peripheral Products Division.....	150/526
Convers-Web Conversational Computing Corp.....	73/400	NEC Direction SPB 400 NEC Computer Systems Division.....	128/542
D-Link Office D-Link Systems Inc.	204/912	NEC SuperScript 1260 NEC Technologies Inc.....	152/527
Dell Dimension XPS R400 Dell Computer Corp.....	116/538	NetGear NetGear Inc.....	210/914
Diamond Supra NetCommander ISDN Diamond Multimedia Systems Inc. Supra Communications Division	/514	Network Appliance NetCache C630 Network Appliance Inc.	218/902
DVRex-M1 Canopus Corp.....	64/405	Okidata OkiPage 20DXn Okidata	152/528
Easy CD Creator Deluxe Adaptec Inc.	45/409	Panasonic KX-P8410 Panasonic Computer Peripherals Co.	168/529
Fargo Signature Fargo Electronics Inc.	45/413	Panasonic KX-PS8000 Panasonic Computer Peripherals Co.....	168/529
FreeHand 8 Macromedia Inc.	68/403	Philips Velo 500 Philips Mobile Computing Group	56/408
Gateway G6-400 Gateway 2000 Inc.	125/539	QMS 2060 EX QMS Inc.....	154/530
GEAR Audio Elektroson Inc.	45/411	QMS 2425 Turbo EX QMS Inc.	154/530
HP Brio PC 8532 Hewlett-Packard Co.	125/540	QMS magicolor 2 CX QMS Inc.....	168/530
HP Color LaserJet 5M Hewlett-Packard Co.....	160/523	QMS magicolor 2 EX QMS Inc.	168/530
HP LaserJet 4000TN Hewlett-Packard Co.....	139/523	Quantex QP6/400 SM-4x Quantex Microsystems Inc.....	130/543
HP LaserJet 5000GN Hewlett-Packard Co.	139/523	Ramp Networks WebRamp Entré Ramp Networks.....	192/506
HP Network ScanJet 5 Hewlett-Packard Co.	64/406	Shiva AccessPort 2.0 Shiva Corp.	197/507
HyCD Music Creative Digital Research	45/412	Shomiti Explorer 1.3 Shomiti Systems Inc.....	217/901
I.Share 2.5 Artisoft Inc.....	184/510	Shomiti Surveyor 2.3 Shomiti Systems Inc.	217/901
IBM InfoPrint 20 IBM Printing Systems Co.....	146/524	SurveySolutions for the Web Perseus Development Corp.....	73/401
Intel InBusiness Intel Corp.....	206/913	Sys Performance Pro 400BADDD Sys Technology Inc.....	130/544
Internet LanBridge 1.35 Virtual Motion.....	184/511	Tektronix Phaser 360 Tektronix Inc.....	171/531
just!audio CeQuadrat (USA) Inc.	45/410	Tektronix Phaser 560 Tektronix Inc.....	171/531

Upgrade Any Camcorder To An **HDTV Resolution** Digital Camera For Your PC!

Digital Camera (Or Video Capture Card)



- Fuzzy Edge Detail and Pixel Blur
- False Color Fringing and Chroma Bleed
- Jaggy Lines with Stair-Stepped Aliasing
- Background Noise and Stray Pixels
- Poor Contrast and Uneven Black Levels

Your Camcorder (With Snappy 3.0)



- DSP Algorithm for Precise Color Purity
- Fuzzy Logic Calculates Razor Sharp Edges
- Time Base Correction Enhances Dynamic Ranges
- Custom Chip Delivers 400% More Pixels
- AI-Based Noise Reduction Detects Pixel "Ghosts"

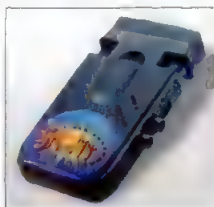
How Is This Possible?

It's a new scientific breakthrough called **8X Temporal Oversampling** and it makes the *impossible* — reality. Incredibly sharp, vibrant HDTV-quality digital pictures from any ordinary camcorder right into your PC. It's all made possible by a new custom chip called the HD-1500, invented by the mathematicians and researchers at Play Incorporated's advanced television labs, and you'll only find it in the amazing Snappy 3.0.



Fast, Easy And Simple To Use

Just plug Snappy into the parallel port of any PC (or laptop) and point your camcorder at a still scene. Then simply press the Snap button and Snappy's proprietary HD-1500 chip and AI-based DSP software algorithms will start 'chewing' on the picture. They'll automatically analyze every detail the camera is seeing (even parts of the signal you can't see) and actually *increase* the resolution of the images from your camcorder. Watching the razor-sharp, enhanced picture appear on your screen is almost magical. Snappy only exists today because of the millions of dollars spent developing the new patented technology behind **Trinity**™, Play's \$5,000 broadcast-quality video special effects system for the television networks. Now you can get the same breathtaking image quality in all your PC pictures. No matter what resolution you work in, from hi-res color printouts to fast-loading web images, you'll be astonished at the incredible difference in every picture.



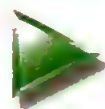
Winner of PC Magazine's "Best Peripheral of the Year"

Only Snappy can deliver stunning video stills with a true optical resolution of 1500 pixels (no bogus pixel stretching). In fact, Snappy holds the world's record for hi-res video capture because nothing else in the world (at any price) comes close to Snappy's unmatched resolution. That's why Snappy has won over 25 awards for technical innovation and engineering excellence from the world's top publications. **New Media Magazine** says "Snappy simply grabs the best video stills... it outperforms a digital camera." The experts at **Photographic Magazine** say "it offers the highest resolution, best quality video stills you can get." **Imaging Magazine** found that Snappy "beats a \$2,000 card" and **PC Magazine** raves "Nothing outperforms the Snappy ... the results are astonishing. Get one — you'll love it."

Snappy is already the best-selling, most award-winning way to bring video pictures into PCs on earth. Now you too can upgrade your existing camcorder to resolutions that visibly blow away those new \$2,000 digital cameras — all for only \$99. Snappy will even upgrade your VCR and TV to give you thousands of incredible PC pictures from any video tape or TV show.*

**The new Snappy 3.0 is available now
at computer stores everywhere.**

\$99



PLAY
INCORPORATED
www.play.com

*Copyright Advisory: Snappy can make precise digital images from all rented movies, laserdiscs and DVDs. Please use it responsibly. The Snappy image above is a completely untouched original dropped directly from Snappy into a PC publishing program to create this ad. It was taken on 1/21/98 with a nine year old Yamaha 8mm consumer camcorder set on full automatic with Snappy 3.0. Your secret number is 31-169-0.

Tiny lawyer words: Play's Snappy, the Snappy logo and Trinity are really cool and trademarks of Play Incorporated. All other trademarks acknowledged. Play is a trademark of Play Incorporated. ©1998. All Rights Reserved.

Choose 293 at www.pcmag.com/infolink

Infolink No.	Company	Product	Page
ACCELERATOR BOARDS			
•	Diamond Multimedia Systems	Graphic Boards	193
•	Intel Corporation	Processors	40-41
247	STB, Inc.	Accelerator Boards	318
ADD-ON BOARDS			
212	ADOpen Inc.	Motherboard	263
218	Asustek Computer Inc.	Motherboard	253-255
101	ATI Technologies	All-in-Wonder Pro	8
200	GigaByte Technology	Motherboard	265
245	Microstar International	Motherboard	258-259
247	STB, Inc.	Accelerator Boards	318
ANTI-VIRUS SOFTWARE			
209	Panda Software	24h-365d AntiVirus Insurance	228
•	Symantec Corporation	Norton AntiVirus	187
•	Symantec Corporation	Small Biz	228
BACKUP SOFTWARE			
342	American Power Conversion	Back-UPS Line	323
•	Digital Equipment Corp.	Storage Works	122-123
BRIDGES/ROUTERS/GATEWAYS			
062	Ameritek	Ameritek	200
033	SMC	EZLine, TigerLine	216
CAD/CAM			
•	Autodesk Inc.	AutoCAD LT	181
CHIPS/PROCESSORS			
•	Intel Corporation	Processors	40-41
106	Kingston Technology Corporation	Memory	53
229	Silicon Integrated Systems	3D Chipset	260
COMMUNICATIONS SOFTWARE			
374	Seagate Software NSMG	Seagate Software-NSMG	205
COMPUTERS/COMPATIBLES			
•	3 Com Corporation	Network Ready PCs	185
100	ABIT Computer Corp.	PC System	247-248
087	Acer America	Travel Mate 7300 Notebook	57
108	Aku	LCD System	172
•	Arlington Computer Products	Mail Order, Peripherals	232
228	CompUSA PC	CompUSA PC	198
198	CompUSA Direct	Mail Order	286-287
199	CompUSA Direct	Mail Order	288
158	COMPUTER DISCOUNT WAREHOUSE	Hardware	273
109	COMPUTER DISCOUNT WAREHOUSE	Hardware	274-275
360	COMPUTER DISCOUNT WAREHOUSE	Hardware	69
159	COMPUTER DISCOUNT WAREHOUSE	Hardware	70-71
•	Dell Computer Corporation	Notebooks, Dimension & Servers	C5-C8
•	Dell Computer Corporation	Workstation	58-59
•	Dell Computer Corporation	Notebooks	90-91
•	Dell Computer Corporation	Servers	102
•	Dell Computer Corporation	Dimension, Notebooks, Servers	136-137
•	Dell Computer Corporation	Servers	161
•	Dell Computer Corporation	Dimension	182-183
•	Dell Computer Corporation	Latitude & Dimension	289
099	Gateway 2000	Notebooks, PCs, Mail Order, Peripherals	109-115
104	Gateway 2000	Notebooks, PCs, Mail Order, Peripherals	36A-H.37
•	Hewlett Packard	NetServer	169
295	J&R Computer World	Systems	270-271
003	Micro Warehouse	Hardware, Software, Systems	282-283
120	Micron Electronics	Systems	FLAP-B
013	Micron Electronics	PCs	15
098	Micron Electronics	NetFrame	16-17
164	Micron Electronics	Micron Family of Products	48A-N
038	Mitac International	LCD-PC	250-251
156	NEC Computer Systems	NEC NOW	2-3
155	NEC Computer Systems	NEC NOW	80-81
154	NEC Computer Systems	NEC NOW	82-83
047	PC Connection	PCs, Peripherals, Software	290-291
•	PC Mail	Hardware, Software, Peripherals	278-279
068	PC Zone	Mail Order	280
173	Premio Computers	Desktops	78
287	ProGen	Desktops and Notebooks	98-99
074	Quantex	Quantex Systems	117-118
309	S.A.G./Storage Solutions	Servers and Storage	32-33
•	Shamrock Technology Co., Ltd.	PCs	257
066	TigerDirect	233 MHz System	333
242	UMAX Technology	Mac System	147
085	Winbook	Winbook 233 MHz Tillamook	77
DATA BASE MANAGERS			
348	Computer Associates	Remotely Possible	215
•	Oracle Corp.	Applications	11
014	Paragon Memory	Infinity	281
DESK TOP PUBLISHING			
383	Puma Technology Inc.	IntelliSynce	231
DIGITAL CAMERAS			
355	Axis Communications	ThinServer Technology	220
DISK BACKUP & TAPE DRIVES			
172	Avatar Peripherals	Shark 250 Mobile Hard Drive	327
228	CompUSA PC	CompUSA PC	198
•	Digital Equipment Corp.	Storage Works	122-123
•	Imation	LS 120 SuperDisk	18-19
•	Zip	Zip	129
•	Imation Corporation	Zip	131
027	Micro Solutions Computer Products	Backpack Bantam CD-ROM	284
DISPLAY PANELS/PROJECTORS			
007	3M Visual Systems Division	AMS	72
108	Aku	LCD System	172
036	Mitac International	LCD-PC	250-251

Infolink No.	Company	Product	Page
227	Shamrock Technology Co., Ltd.	LCD Monitors Display	257
•	Sony Computer Products	LCD Projectors	159
EDUCATIONAL SOFTWARE			
332	Corel Corporation	Ventura 8	165
ELECTRONIC MAIL			
222	Videonics	Python	325
206	Web Communications	WebCom Internet Services	211
ENTERTAINMENT SOFTWARE			
332	Corel Corporation	Ventura 8	165
FAX SOFTWARE			
•	3 Com Corporation	PC Card	194-195
GRAPHICS SOFTWARE			
•	Adobe Systems Inc.	Adobe Illustrator 7.0	177
332	Corel Corporation	Ventura 8	191
HAND-HELD PC'S			
•	Microsoft	Palm Pilot	74-75
000/383	Puma Technology Inc.	IntelliSynce	231
HARD DRIVES			
172	Avatar Peripherals	Shark 250 Mobile Hard Drive	327
228	CompUSA PC	CompUSA PC	198
•	Imation Corporation	Zip	129
•	Imation Corporation	Zip	131
019	L.A. Trade	Memory, Hard Drives, PCMCIA	285
014	Paragon Memory	Infinity	281
178	PowerQuest Corp.	Drive Image	96
315	Syquest Technology	Syquest Sparq	25
HARDWARE			
•	3 Com Corporation	SuperStack	207
007	3M Visual Systems Division	AMS	72
030	A.T. Cross Company	Cross Pen	20
100	ABIT Computer Corp.	PC System	247-248
087	Acer America	Travel Mate 7300 Notebook	57
172	Avatar Peripherals	Shark 250 Mobile Hard Drive	327
228	CompUSA PC	CompUSA PC	198
203	Crucial Technology	Micron Memory Upgrades	85
•	Dell Computer Corporation	Notebooks, Dimension & Servers	C5-C8
•	Dell Computer Corporation	Servers	102
•	Dell Computer Corporation	Dimension, Notebooks, Servers	136-137
•	Dell Computer Corporation	Servers	161
•	Dell Computer Corporation	Dimension	182-183
•	Dell Computer Corporation	Latitude & Dimension	289
•	Dell Computer Corporation	Notebooks	90-91
•	Diamond Multimedia Systems	Graphic Boards	193
•	Diamond Multimedia Systems	56K Modem	31
•	Hewlett Packard	NetServer	169
•	Iiyama Direct	Monitors	44
084	Iiyama North America	Monitors	86
•	Imation	LS 120 SuperDisk	18-19
278	Insight	Insight Mail Order	95
•	Intel Corporation	Processors	40-41
•	Imation Corporation	Zip	129
•	Imation Corporation	Zip	131
295	J&R Computer World	Hardware	270-271
106	Kingston Technology Corporation	Memory	53
094	Lexmark International Inc.	Lexmark Printers	155
003	Micro Warehouse	Hardware, Software, Systems	282-283
120	Micron Electronics	Systems	FLAP-B
098	Micron Electronics	NetFrame	16-17
164	Micron Electronics	Micron Family of Products	48A-N
036	Mitac International	LCD-PC	250-251
118	Optique	V-Series Monitor	179
014	Paragon Memory	Infinity	281
330	PC Mail	Hardware, Software, Peripherals	278-279
080	PC Power & Cooling Systems	Power Protection/Cooling Devices	88
068	PC Zone	Mail Order	280
021	Philips Business Electronics	Monitors	243-245
173	Premio Computers	Desktops	78
031	Princeton Graphics Systems	Monitors	62-63
287	ProGen	Desktops and Notebooks	98-99
024	QMS	QMS Magicolor 2	227
309	S.A.G./Storage Solutions	Servers and Storage	32-33
•	Samsung Electronics	Samsung Monitors	34
•	Sony Computer Products	LCD Projectors	159
023	Sun Microsystems	Sun Workgroup Server	5
335	Sun Microsystems	Ultra-5 WorkStation	105
315	Syquest Technology	Syquest Sparq	25
066	TigerDirect	233 MHz System	333
377	Toshiba	Notebook Computers	26-27
222	Videonics	Python	325
290	ViewSonic	GS771 Monitors	84
HUBS			
•	3 Com Corporation	SuperStack	207
062	Ameritek	Ameritek	200
•	Intel Corporation	Adapter Card	223
033	SMC	TigerLine	216
033	SMC	EZLine	216
IMAGE EDITING SOFTWARE			
•	Adobe Systems Inc.	Adobe Illustrator 7.0	177
INFORMATION MANAGERS			
201	Maximizer Technologies	Maximizer	237
INTERNET			
133	COMPUTER DISCOUNT WAREHOUSE	Networking Products	224-225
222	Videonics	Python	325
206	Web Communications	WebCom Internet Services	211

Infolink No.	Company	Product	Page
LAPTOP/PORTABLE COMPUTERS			
087	Acer America	Travel Mate 7300 Notebook	57
218	Asustek Computer Inc.	Notebooks	253-255
198	CompUSA Direct	Mail Order	286-287
199	CompUSA Direct	Mail Order	288
158	COMPUTER DISCOUNT WAREHOUSE	Laptops	273
109	COMPUTER DISCOUNT WAREHOUSE	Laptops	274-275
360	COMPUTER DISCOUNT WAREHOUSE	Laptops	69
159	COMPUTER DISCOUNT WAREHOUSE	Laptops	70-71
•	Dell Computer Corporation	Notebooks, Dimension & Servers	C5-C8
•	Dell Computer Corporation	Latitude & Dimension	289
•	Dell Computer Corporation	Notebooks	90-91
099	Gateway 2000	Notebooks, PCs, Mail Order, Peripherals	109-115
104	Gateway 2000	Notebooks, PCs, Mail Order, Peripherals	36A-H.37
295	J&R Computer World	Systems, Hardware, Peripherals	270-271
003	Micro Warehouse	Hardware, Software, Systems	282-283
156	NEC Computer Systems	NEC NOW	2-3
155	NEC Computer Systems	NEC NOW	80-81
154	NEC Computer Systems	NEC NOW	82-83
330	PC Mail	Hardware, Software, Peripherals	278-279
068	PC Zone	Mail Order	280
287	ProGen	Desktops and Notebooks	98-99
227	Shamrock Technology Co., Ltd.	Notebook Computers	257
377	Toshiba	Notebook Computers	26-27
085	Winbook	Winbook 233 MHz Tillamook	77
LOCAL AREA NETWORKING			
•	3 Com Corporation	SuperStack	207
348	Computer Associates	Remotely Possible	215
158	COMPUTER DISCOUNT WAREHOUSE	Networking Products	273
109	COMPUTER DISCOUNT WAREHOUSE	Networking Products	274-275
360	COMPUTER DISCOUNT WAREHOUSE	Networking Products	69
159	COMPUTER DISCOUNT WAREHOUSE	Networking Products	70-71
051	Data Comm Warehouse	Networking Products	219
•	Intel Corporation	Adapter Card	223
024	QMS	QMS Magicolor 2	227
374	Seagate Software NSMG	Seagate Software-NSMG	205
073	South Hills Datacomm	Networking Products	212
MAIL ORDER			
108	Aku	LCD System	172
306	Arlington Computer Products	Mail Order, Peripherals	232
228	CompUSA PC	CompUSA PC	198
198	CompUSA Direct	Mail Order	286-287
199	CompUSA Direct	Mail Order	288
158	COMPUTER DISCOUNT WAREHOUSE	Reseller	273
109	COMPUTER DISCOUNT WAREHOUSE	Reseller	274-275
360	COMPUTER DISCOUNT WAREHOUSE	Reseller	69
159	COMPUTER DISCOUNT WAREHOUSE	Reseller	70-71
051	Data Comm Warehouse	Networking Products	219
099	Gateway 2000	Notebooks, PCs, Mail Order, Peripherals	109-115
104	Gateway 2000	Notebooks, PCs, Mail Order, Peripherals	36A-H.37
278	Insight	Insight Mail Order	95
295	J&R Computer World	Systems, Hardware, Peripherals	270-271
019	L.A. Trade	Memory, Hard Drives, PCMCIA	285
047	PC Connection	PCs, Peripherals, Software	290-291
330	PC Mail	Hardware, Software, Peripherals	278-279
068	PC Zone	Mail Order	280
074	Quantex	Quantex Systems	117-119
066	TigerDirect	233 MHz System	333
085	Winbook	Winbook 233 MHz Tillamook	77
MASS STORAGE			
172	Avatar Peripherals	Shark 250 Mobile Hard Drive	327
•	Image Corporation	Zip	129
•	Image Corporation	Zip	131
027	Micro Solutions Computer Products	Backpack Bantam CD-ROM	284
MEMORY			
203	Crucial Technology	Micron Memory Upgrades	65
106	Kingston Technology Corporation	Memory	53
019	L.A. Trade	Memory, Hard Drives, PCMCIA	285
MISCELLANEOUS			
•	Anthro Corporation	Computer Furniture	24
197	Corix Technologies	CardScan	94
•	Pantone Inc.	Office Color Assistant	240
293	Play Inc.	Snappy	329
024	QMS	QMS Magicolor 2	227
•	ZD-TV	ZDTV	267
MODEMS			
•	3 Com Corporation	PC Card	194-195
•	Arlington Computer Products	Mail Order, Peripherals	232
133	COMPUTER DISCOUNT WAREHOUSE	Networking Products	224-225
•	Diamond Multimedia Systems	56K Modem	31
158	NEC Computer Systems	NEC NOW	2-3
155	NEC Computer Systems	NEC NOW	80-81
154	NEC Computer Systems	NEC NOW	82-83
MONITORS			
108	Aku	LCD System	172
184	Avama Direct	Monitors	44
084	Avama North America	Monitors	86
158	NEC Computer Systems	NEC NOW	2-3
155	NEC Computer Systems	NEC NOW	80-81
154	NEC Computer Systems	NEC NOW	82-83
157	NEC Technologies	A&E Monitors	144-145
•	Nokia	Monitors	54-55
118	Optique	V-Series Monitor	179
021	Philips Business Electronics	Monitors	243-245
031	Princeton Graphics Systems	Monitors	62-63
•	Samsung Electronics	Samsung Monitors	34
227	Shamrock Technology Co., Ltd.	Monitors	257
298	ViewSonic	GS771 Monitors	84
MULTIMEDIA HARDWARE			
007	3M Visual Systems Division	AMS	72

Infolink No.	Company	Product	Page
101	ATI Technologies	All-In-Wonder Pro	8
113	ArcSoft	ZipShot	321
198	CompUSA Direct	Mail Order	286-287
199	CompUSA Direct	Mail Order	288
•	Diamond Multimedia Systems	Graphic Boards	193
027	Micro Solutions Computer Products	Backpack Bantam CD-ROM	284
MULTIMEDIA SOFTWARE			
332	Corel Corporation	Ventura 8	165
NETWORK INTERFACE CARDS			
•	3 Com Corporation	Network Ready PCs	185
133	COMPUTER DISCOUNT WAREHOUSE	Networking Products	224-225
•	Microsoft	Microsoft NT Workstation	126-127
033	SMC	EZLine	216
NETWORK SYSTEMS/EQUIPMENT			
355	Aus Communications	ThinServer Technology	220
133	COMPUTER DISCOUNT WAREHOUSE	Networking Products	224-225
051	Data Comm Warehouse	Networking Products	219
•	Dell Computer Corporation	Servers	102
•	Dell Computer Corporation	Servers	161
•	Microsoft	Microsoft NT Workstation	126-127
073	South Hills Datacomm	Networking Products	212
NETWORKING SOFTWARE			
133	COMPUTER DISCOUNT WAREHOUSE	Networking Products	224-225
•	Dell Computer Corporation	Workstation	58-59
191	Meridian Data	CD Networking	208-209
299	Network Associates	Software	153
•	Symantec Corporation	Norton AntiVirus	187
•	Symantec Corporation	Small Biz	226
ON LINE SERVICES			
•	ZD Net	NetBuyer	266
OPERATING SYSTEMS			
•	Microsoft	Digital Nervous System	22-23
ORGANIZATIONAL SOFTWARE			
•	Microsoft	Microsoft Office 97	C2-C4, p. 1
•	Microsoft	Microsoft Press	143
PC ACCESSORIES			
•	3 Com Corporation	Network Ready PCs	185
030	A.T. Cross Company	Cross Pen	20
PC DIRECT			
198	CompUSA Direct	Mail Order	286-287
199	CompUSA Direct	Mail Order	288
158	COMPUTER DISCOUNT WAREHOUSE	Reseller	273
109	COMPUTER DISCOUNT WAREHOUSE	Reseller	274-275
360	COMPUTER DISCOUNT WAREHOUSE	Reseller	69
159	COMPUTER DISCOUNT WAREHOUSE	Reseller	70-71
•	Dell Computer Corporation	Latitude & Dimension	289
295	J&R Computer World	Systems, Hardware, Peripherals	270-271
019	L.A. Trade	Memory, Hard Drives, PCMCIA	285
027	Micro Solutions Computer Products	Backpack Bantam CD-ROM	284
003	Micro Warehouse	Hardware, Software, Systems	282-283
014	Paragon Memory	Infinity	281
047	PC Connection	PCs, Peripherals, Software	290-291
330	PC Mail	Hardware, Software, Peripherals	278-279
068	PC Zone	Mail Order	280
PCMCIA			
•	3 Com Corporation	PC Card	194-195
019	L.A. Trade	Memory, Hard Drives, PCMCIA	285
PERIPHERALS			
007	3M Visual Systems Division	AMS	72
030	A.T. Cross Company	Cross Pen	20
355	Aus Communications	ThinServer Technology	220
•	Diamond Multimedia Systems	56K Modem	31
004	Epson America	Epson Printer	12-13
099	Gateway 2000	Notebooks, PCs, Mail Order, Peripherals	109-115
104	Gateway 2000	Notebooks, PCs, Mail Order, Peripherals	36A-H.37
•	Imation	LS 120 SuperDisk	18-19
•	Intel Corporation	Adapter Card	223
295	J&R Computer World	Peripherals	270-271
094	Lexmark International Inc.	Lexmark Printers	155
047	PC Connection	PCs, Peripherals, Software	290-291
330	PC Mail	Hardware, Software, Peripherals	278-279
024	QMS	QMS Magicolor 2	227
247	STB, Inc.	Accelerator Boards	318
POWER PROTECTION			
342	American Power Conversion	Back-UPS Line	323
080	PC Power & Cooling Systems	Power Protection/Cooling Devices	88
PRINTER ACCESSORIES			
024	QMS	QMS Magicolor 2	227
127	Ringdale	Print Server	213
PRINTERS			
004	Epson America	Epson Printer	12-13
094	Lexmark International Inc.	Lexmark Printers	155
153	NEC Technologies	1260 SuperScript Printer	165
PROGRAM DEVELOPERS			
•	Microsoft	Internet Platform	50-51
PROGRAMMERS TOOLS UTILITIES			
176	PowerQuest Corp.	Drive Image	96
REMOTE COMPUTING			
•	3 Com Corporation	PC Card	194-195
•	Diamond Multimedia Systems	56K Modem	31

Infotlink No.	Company	Product	Page
315	Syquest Technology	Syquest Sparq	25
SCANNERS			
197	Correa Technologies	CardScan	94
241	UMAX Technology	Scanner	149
SERVERS			
*	Compaq Computer Corporation	Compaq Computer Corporation	151
*	Dell Computer Corporation	Notebooks, Dimension & Servers	C5-C8
*	Dell Computer Corporation	Workstation	58-59
*	Dell Computer Corporation	Servers	102
*	Dell Computer Corporation	Dimension, Notebooks, Servers	136-137
*	Dell Computer Corporation	Servers	161
*	Dell Computer Corporation	Dimension	182-183
*	Hewlett Packard	NetServer	189
120	Micron Electronics	Systems	FLAP-8
100	Micron Electronics	NetFrame	16-17
*	Microsoft	Microsoft NT Workstation	128-127
150	NEC Computer Systems	NEC NOW	2-3
100	NEC Computer Systems	NEC NOW	80-81
154	NEC Computer Systems	NEC NOW	82-83
*	Oracle Corp	Applications	11
127	Rangdale	Print Server	213
100	S A G/Storage Solutions	Servers and Storage	32-33
023	Sun Microsystems	Sun Workgroup Server	5
SOFTWARE			
*	Adobe Systems Inc.	Adobe Illustrator 7.0	177
171	Innovative Software	Ghost Software	167
201	Maximizer Technologies	Maximizer	237
191	Mendian Data	CD Networking	208-209
003	Micro Warehouse	Hardware, Software, Systems	282-283
*	Microsoft	Microsoft Office 97	C2-C4 p.1
*	Microsoft	Microsoft Press	143
*	Microsoft	Microsoft NT Workstation	128-127
299	Network Associates	Software	153
100	Panda Software	24h-365d Antivirus Insurance	228
047	PC Connection	PCs, Peripherals, Software	290-291
330	PC Mail	Hardware, Software, Peripherals	278-279
176	PowerQuest Corp.	Drive Image	96
100	Puma Technology Inc.	Intellasync	231
*	SPSS, Inc.	SPSS 8.0 for Windows	234
*	Symantec Corporation	Norton AntiVirus	187
*	Symantec Corporation	Small Biz	226
222	Videonics	Python	325
STATISTICAL SOFTWARE			
*	SPSS, Inc.	SPSS 8.0 for Windows	234
057	Statsoft	Statistical Software	43
TELECOMMUNICATIONS			
*	Diamond Multimedia Systems	56K Modem	31
TRAINING/SEMINARS/CONFERENCES			
*	ZD Comdex & Forums	Networld + Interop Las Vegas '98	282
UTILITIES			
171	Innovative Software	Ghost Software	167
299	Network Associates	Software	153
176	PowerQuest Corp.	Drive Image	96
*	Symantec Corporation	Norton AntiVirus	187
*	Symantec Corporation	Small Biz	226
VIDEO CONFERENCING			
007	3M Visual Systems Division	AMS	72
VIDEO GRAPHICS/BOARDS			
*	Diamond Multimedia Systems	Graphic Boards	193
380	Matrox Graphics Inc.	Productiva G100	92
*	Silicon Integrated Systems	3D Chipset	260
WEB/INTERNET SERVICES			
356	Axis Communications	ThinServer Technology	220
WINDOWS SOFTWARE			
*	Adobe Systems Inc.	Adobe Illustrator 7.0	177
348	Computer Associates	Remotely Possible	215
*	Microsoft	Microsoft Office 97	C2-C4 p.1
*	Microsoft	Microsoft Press	143
176	PowerQuest Corp.	Drive Image	96
*	SPSS, Inc.	SPSS 8.0 for Windows	234
057	Statsoft	Statistical Software	43
*	Symantec Corporation	Norton AntiVirus	187
*	Symantec Corporation	Small Biz	226
WORK GROUP SOFTWARE			
*	Dell Computer Corporation	Workstation	58-59
023	Sun Microsystems	Sun Workgroup Server	5
WORKSTATION SOFTWARE			
*	Dell Computer Corporation	Workstation	58-59
WORKSTATIONS			
013	Micron Electronics	PCs	15
335	Sun Microsystems	Ultra-5 WorkStation	5

For Additional Categories see MARKETPLACE PRODUCT INDEX PAGE 293.

Coming Up

What's in the Next Issue of *PC Magazine*

The Future of Computing

Again this year *PC Magazine* looks into the future to give you our take on where personal computing is going—especially from a product point of view. Rather than just offering up some guesses, though, we're making solid projections about what PC computing is likely to look like in two or three years. We also make suggestions in many business areas and for consumers and end users.

Evolution Across the Industry

We break out our projections into areas as diverse as graphics and home automation, digital imaging and virus detection, databases and storage, agent technology and encryption, virtual reality and storage. What might user interfaces look like three years from now? What kinds of batteries will laptops be using? How will displays evolve? How will you be connecting to the Internet at the turn of the millennium? The first step in preparing yourself for the future is to study it. We get you started with coverage in 25 important areas of PC computing.

What's Going On in Research?

As part of our coverage, we made the rounds of the research and development labs at some of the most influential companies in the industry. We report about what they're working on and what it will mean for your future.



ZIFF-DAVIS INC.

Chairman and CEO Eric Hippeau

Chief Financial Officer Timothy O'Brien

Presidents Bob Brown (ZD Market Intelligence), Jason Chudnofsky (ZD Comdex and Forums), Terri Holbrook (ZD Brand and Market Services), Dan Rosensweig (ZD Internet Productions), William Rosenthal (ZD Education), Claude P. Sheer (ZD Publishing), Larry W. Wangberg (ZD Television) **Executive Vice President** Joe Gillespie (Corporate Sales) **Senior Vice Presidents** Rayna Brown, Daryl R. Otte **Vice Presidents** Steve Gladyszewski, J. Malcolm Morris, Mark Moyer, Tracy Nadi **Treasurer** Thomas L. Wright

ZD Media Network Jeff Bruce, Rita Burke, Scott Murphy

ZD Brand & Market Services

Vice Presidents Brooke Correll, Michael Perkowski, Herb Stern, Elda Vale **Director, Corporate Communications** Gregory Jarboe

ZD Publishing

President Claude P. Sheer **Executive Vice Presidents** Don Byrnes, Chris Dobbrow, Jack Dolce, Al DiGuido, Thomas McGrade **Executive Vice President and Editorial Director, ZD Publishing** Michael J. Miller **Senior Vice President** Nancy Newman **Vice Presidents** Bob Bader, John Dodge, Kathleen Goodwin, Roger Hermann, Jonathan Lane, Eric Lundquist, Bill Machrone, Jim Manning, Charles Mast, James F. Ramaley, Paul Somerson, Mark Van Name, Sam Whitmore **Executive Director, Licensing** Gertrud Borchardt **Director, ZD Benchmark Operation** Bill Catchings **Director, ZD Labs** Lauren Black

PC Magazine, ISSN 0888-8507, is published twice a month except in July and August at \$49.97 for one year. Ziff Davis Inc., One Park Ave., New York, NY 10016-5802. Periodicals postage paid at New York, NY 10016-5802 and at additional mailing offices. POSTMASTER: Address changes to *PC Magazine*, P.O. Box 54093, Boulder, CO 80328-4093. The Canadian GST registration number is 14049 6720 RT. Canada Post International Publications Mail Product (Canadian Distribution) Sales Agreement No. 268477. Printed in the U.S.A.

TigerSystems *Your In-Stock Value Source!* *Ready To Ship!*

HARDWARE, SOFTWARE, SYSTEMS, ACCESSORIES. THE INDUSTRY'S BEST TELEPHONE SALES STAFF!

Complete Systems With Monitor!

800-830-0052

WE'RE STANDING BY TO SERVE YOU 24 HOURS A DAY!



LOWEST PRICES GUARANTEED!

"Quality construction and top-level components at a low price..."

Windows Magazine, April, '98

"BEST BUY!"

Windows Magazine, April, '98

WinList



JBL Media 100 speakers shown

The Tiger Family PC Value Line IBM 6x86MX PR 200

16MB High-Speed EDO RAM
2.5 Gigabyte Western Digital UDMA Hard Drive
14-Inch Tiger by KDS Monitor (28mm Dot Pitch) Viewable: 13.2"
24-Speed CD-ROM Drive, 1.44MB Floppy Drive
64-Bit S3-Virge 3D Video Card With 2MB RAM
KDS 56K Hyper Modem (With Fax & Voice)
Wave Table 3D Sound Onboard
Amplified Stereo Speakers, Boom Microphone
9-Bay Case With 200-Watt Power Supply
Microsoft Windows 95 Pre-Installed
Premium Windows 95 Keyboard And Mouse
ONE-YEAR DEPOT PARTS AND LABOR WARRANTY
TOLL-FREE TECHNICAL SUPPORT

Also Includes Canon BJC-250 Color Printer
And Dow Jones On-Site Setup

"SET UP LITERALLY COULDN'T BE EASIER..."
—FAMILY PC, MARCH '98

ONLY \$949⁹⁹

Part # TCS1



LEASE FROM \$34/mo.

The Tiger Small Office Line AMD K6-200 with MMX

32MB High-Speed EDO RAM
3.2 Gigabyte Western Digital UDMA Hard Drive
15-Inch Tiger by KDS Monitor (28mm Dot Pitch) Viewable: 13.9"
24-Speed CD-ROM Drive, 1.44MB Floppy Drive
64-Bit S3-Virge 3D Video Card With 4MB RAM
KDS 56K Hyper Modem (With Fax & Voice)
Wave Table 3D Sound Onboard
Amplified Stereo Speakers, Boom Microphone
9-Bay Case With 200-Watt Power Supply
Microsoft Windows 95 Pre-Installed
Premium Windows 95 Keyboard And Mouse
ONE-YEAR DEPOT PARTS AND LABOR WARRANTY
TOLL-FREE TECHNICAL SUPPORT

IBM 6x86MX PR 200 \$929.99 (CTBTM2)
AMD K6-200MMX \$899.99 (CTBTM3) Intel P-200MMX \$939.99 (CTBTM4)

"TIGER DIRECT HAS A GREAT PACKAGE FOR YOU..."
—FAMILY PC, MARCH '98

ONLY \$899⁹⁹

Part # CTBTM3

LEASE FROM \$32/mo.

The Tiger Professional Line AMD K6-266 with MMX

New!

ONE-YEAR ON-SITE WARRANTY

PENTIUM II SYSTEMS ARE DMI 2.0 COMPLIANT

64MB Premium-Speed SDRAM
4.3 Gigabyte Western Digital UDMA Hard Drive
15-Inch Tiger by KDS Monitor (28mm Dot Pitch) Viewable: 13.9"
32-Speed CD-ROM Drive, 1.44MB Floppy Drive
128-Bit AGP 3D Video Card With 4MB
KDS 56K Hyper Modem (With Fax & Voice)
Yamaha Wave Table 3D Sound
JBL Media 100 Amplified Stereo Speakers & Boom Microphone
6-Bay Case With 235-Watt Power Supply
Microsoft Windows 95 Pre-Installed
Premium Windows 95 Keyboard & Microsoft IntelliMouse
ONE-YEAR ON-SITE WARRANTY & TOLL-FREE TECH SUPPORT

AMD K6 233MMX \$1079.99* (CTBTM6)
AMD K6 266MMX \$1199.99 (CTBTM14)
IBM 6x86MX PR 233 \$1099.99* (CTBTM5)
Intel Pentium II 233MHz MMX \$1249.99* (CTBTM7)
* Includes 48MB of SDRAM

ONLY \$1,199⁹⁹

Part # CTBTM14

LEASE FROM \$42/mo.

The Tiger High-End Professional Line Intel Pentium II 300MHz MMX

64MB Premium-Speed SDRAM
6.4 Gigabyte Western Digital UDMA Hard Drive (266 is 4.3)
17-Inch Tiger by KDS Monitor (28mm D.P.) Viewable: 15.8"
32-Speed CD-ROM Drive, 1.44MB Floppy Drive
ATI 128-Bit AGP RAGE 2 3D Video Card With 4MB RAM
6-Bay Case With 235-Watt Power Supply
With Exclusive 4-Cooling Fan Design
KDS 56K Hyper Modem (With Fax & Voice)
Yamaha Wave Table 3D Sound
JBL Media 100 Amplified Stereo Speakers & Boom Microphone
Microsoft Windows 95 Pre-Installed
Premium Windows 95 Keyboard & Microsoft IntelliMouse
ONE-YEAR ON-SITE WARRANTY & TOLL-FREE TECH SUPPORT

Intel Pentium II 266MHz MMX \$1479.99 (CTBTM8)
Intel Pentium II 300MHz MMX \$1679.99 (CTBTM9)
Intel Pentium II 333MHz MMX \$1799.99 (CTBTM10)
Intel Pentium II 350MHz MMX \$1999.99 (CTBTM11)

ONE-YEAR ON-SITE WARRANTY

PENTIUM II SYSTEMS ARE DMI 2.0 COMPLIANT

ONLY \$1,679⁹⁹

Part # CTBTM9

LEASE FROM \$59/mo.

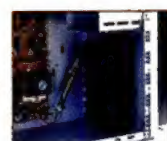
"THE TOP-DRAWER COMPONENT SYSTEMS." Windows Magazine, 4-98



Every Tiger system is built from the ground up with the industry's best components. Value, performance—and in stock! Call us first!

We Build and Sell Technology Values!

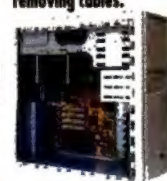
Tiger starts with the best components and incorporates them into the industry's best PC values. We don't cut corners with our parts—everything from the power supply to the chip set is top-shelf. AMD, Intel, IBM, NEC, U.S. Robotics, Creative Labs, ATI, JBL and Yamaha.



All Tiger cases feature our 4-cooling fan design. Keeps your system and all its peripherals cool for years of trouble-free computing!

On-Site Set-Up And Installation And Training By Dow Jones Technicians!

Get up and running fast—with professional ON-SITE INSTALLATION AND TRAINING! When you purchase a new PC and monitor from Tiger, ask about this low-cost service—performed by Dow Jones Field Representatives (a company you know and trust). Eliminate "Installation Anxiety". It's the fast, easy—and affordable way to get your new system up and running! Give us a call for details.



Our systems feature removable side panel for easy access without removing cables.

DOW JONES On-Site Service

Home/Office Installation And Warranty

Our Systems Are Easy To Own. Including Flexible Leasing! Our new Tiger Easy Leasing program makes sense—it's affordable, easy, flexible—and it gives you the opportunity to affordably upgrade your system when the hotter new models come out in a couple of years!

We Provide An Ironclad Guarantee! Plus Toll-Free 800 Phone Tech Support! We offer a rock-solid Warranty on every system we sell. And we provide free telephone support—via an 800 number. We've dedicated ourselves to providing the best technology—for business, for home office, for education and for entertainment—at the best price.

Special Modem Offer!

Rockwell-Based 56.6K Flex, Fully Compatible Modem With 230K Hyper Modem Feature!

- Full Duplex Speakerphone
- Up to 230,000 kbps Hyper modem feature!
- Voice, Data, Fax, SVD, Caller ID



Order# A109-1028 ■ AMQUEST

SHOP WITH US ON-LINE!

Our Web site now includes a PC Configurator—design your own computer and we'll build it to your exact specifications. Log on today and check it out!

www.tigerdirect.com

FREE Tiger Catalog

Get a FREE subscription of the TigerDirect catalog—each issue features over 150 pages packed with new hardware, software, systems and accessories! You'll get the latest on the best that the computer industry has to offer, at the lowest prices!

800-830-0052

PRESS-TIME SPECIAL!



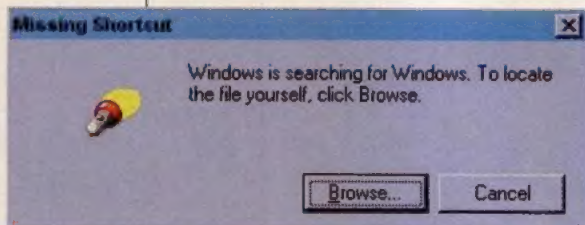
21" Monitor

1600x1200 Max Resolution
Giant 19.9" Viewable Area

\$799⁹⁹

M120-1018 \$799.99

Abort, Retry, Fail?



Let us know  when you find it!
(Microsoft Windows 95.)



Teach Your Children Well

"Kids love to jump all over everything, so why not make a game of it. Cut out several lily pads from sheets of green construction paper. Decorate with an alphabet letter. Then, encourage your little leapfrog to jump.

Try spelling out special words or names. ('Jump to the S, jump to the A, now jump back to the S. You've just spelled SAM!')"—MSNBC's FAMILY ROOM PLAYDATES

And won't  Robert Jones be surprised!
(Computerworld.)

By generating multiple keys for a name, SSA's software can find Robert Jones if you enter Bob Smith, John Smith if you enter Smith John and XYZ Corp. if you enter XYZ, Inc.

The Wrong Kind of PC Speed

"A young man apparently high on methamphetamine mistook a computer game sequence for an intruder into his trailer, picked up a shotgun, and fired. Deputies found his computer destroyed by the blast and [the man] 'all messed up.'"

"That's a typical methamphetamine response," said a spokesman for the Mesa County Sheriff's Department."

—THE DENVER POST



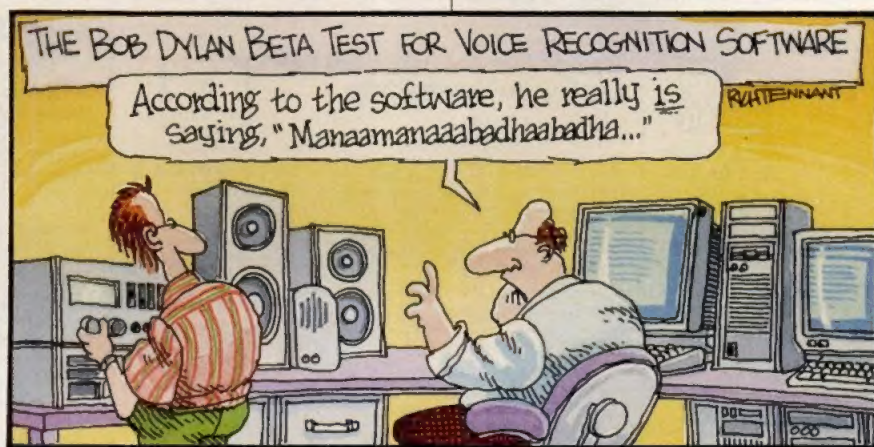
 **Newsweek**,
January 28, 1998. On
page 38: a photo of
dead frozen cows.
On page 39: an ad for
Gateway 2000.



Help Wanted—Only the Tough Need Apply

"Web Programmer—CGI, PERL, JavaScript, SQL, Unix, HTML, black belt needed. Work with the best—ASAP!"

—THE BURLINGTON (VERMONT) TIMES



If your entry is used, we'll send you \$50 and a PC Magazine T-shirt. Send your entries to Abort, Retry, Fail?, PC Magazine, One Park Ave., New York, NY 10016-5802. Winners this issue: Alton Ayers, Jonathan Blake, Ross Eisenbeis, J.D. Hoffman, Louis Lauzon, and Steve Steffler.

IT'S HARD TO KEEP ONE OF THE FASTEST NOTEBOOKS ON EARTH A SECRET...

DELL® INSPIRON™ 3200
MOBILE PENTIUM® II PROCESSOR

NEW DELL® INSPIRON™ 3200 D266XT
266MHz PENTIUM® II PROCESSOR
FEATURING MMX™ TECHNOLOGY

- ★ **13.3" XGA Active Matrix TFT Display**
- ★ **32MB SDRAM Memory**
- ★ **512KB L2 Pipeline Burst Cache**
- ★ **4GB Ultra ATA Hard Drive**
- ★ **Modular Bay accepts 24X Max™ Variable CD-ROM, 3.5" Floppy Drive (both included) or Optional 2nd Li-Ion Battery**
- ★ **128-bit Graphics Accelerator with 65K Colors at 1024x768**
- ★ **Zoom Video and USB Ports**
- ★ **Stereo Speakers with 3D Surround Sound and Yamaha SW Wavetable**
- ★ **Smart Lithium Ion Battery**
- ★ **Cardbus Ready/Fast IR1.1**
- ★ **MS® Office 97 Small Business Edition**
- ★ **MS Windows® 95 and MS Internet Explorer**
- ★ **FREE MS Windows 98 Upgrade Packet***
- ★ **6.9 Pounds*/Touchpad**
- ★ **Extendable 1-Year Limited Warranty†**
- ★ **Upgrade to 64MB SDRAM, add \$199.**
- ★ **56K Capable** x2 Modem, add \$149.**
- ★ **2nd Smart Lithium Ion Battery, add \$169.**

\$2999

Business Lease*: \$114/Mo., 36 Mos.
Order Code #890419

A notebook with a mobile Pentium® II processor? You're not dreaming. It's the latest addition to the award-winning Dell® Inspiron™ line of notebook computers. Imagine flying along with a turbo-charged 266MHz mobile Pentium II processor that hosts a 13.3" XGA active matrix display, 32MB of SDRAM and a 4GB Ultra ATA hard drive – without having to pay a first-class price tag. These are among the fastest notebooks on Earth today. And you can expect them to move accordingly. So now that you're in on the secret, place a direct call or visit our website to secure yours today.



DELL®

TO ORDER TOLL-FREE

800-225-4906

TO ORDER ONLINE 24 HRS./DAY

www.dell.com/buydell

Mon-Fri 7am-9pm CT • Sat 10am-6pm CT
Sun 12pm-5pm CT • In Canada* call 800-233-0702
GSA Contract #GS-35F-4076D

Keycode #04705

OUR NON-DISCLOSURE JUST EXPIRED. INTRODUCING THE DELL DIMENSION XPS R400

PC
MAGAZINE

L
I
B
R
A
R
Y

400 MHz
PENTIUM® II PROCESSOR

NEW DELL DIMENSION XPS R400 400MHz PENTIUM® II PROCESSOR FEATURING MMX™ TECHNOLOGY

- ★ 64MB 100MHz SDRAM Memory
- ★ 512KB Integrated L2 Cache
- ★ 8.4GB Ultra ATA Hard Drive (9.5ms)
- ★ 1000LS 17" (15.9" v.i.s.) Monitor
- ★ NEW Diamond Permedia 2 8MB 3D AGP Video Card
- ★ 32X Max[^] Variable CD-ROM Drive
- ★ NEW Turtle Beach Montego A3D 64 Voice PCI Sound Card
- ★ Altec Lansing ACS-90 Speakers
- ★ Microsoft® Office 97 Small Business Edition Plus Bookshelf 98; McAfee VirusScan
- ★ Microsoft Windows® 95 and Internet Explorer
- ★ **FREE MS® Windows 98 Upgrade Packet[†]**
- ★ Dell® QuietKey® Keyboard
- ★ MS IntelliMouse®
- ★ 3-Year Limited Warranty[†]
- ★ 1-Year On-site[^] Service
- ★ Upgrade to 128MB SDRAM, add \$199.
- ★ Upgrade to a new 16.8GB Ultra ATA Hard Drive (9.5ms), add \$299.

\$2499

Business Lease^o: \$95/Mo., 36 Mos.
Order Code #590423

Simply stated, they're our fastest desktops yet. The Dell Dimension® XPS R series featuring the new 350 and 400MHz Pentium® II processors. Imagine this: A 400MHz Intel Pentium II processor racing a full 33% faster than its 333MHz predecessor. The new Intel 440BX chipset with 100MHz SDRAM keeping pace with greatly improved memory performance – up to 50% faster in burst mode.



pentium® II
PROCESSOR

An 8.4GB Ultra ATA hard drive. 8MB 3D AGP video. 64 voice A3D PCI sound. And speakers. We were among the first to glimpse this new technology and offer it like this. Now, who among you will be the first to call?

Reference the appropriate order code to receive featured configuration and pricing.

DELL®

TO ORDER TOLL-FREE

800-225-4906

TO ORDER ONLINE 24 HRS./DAY

www.dell.com/buydell

Mon-Fri 7am-9pm CT • Sat 10am-6pm CT
Sun 12pm-5pm CT • In Canada, call 800-233-0702
GSA Contract #GS-35F-4076D

Keycode #04704